

# MARINE REVIEW

WEEKLY.] AND MARINE RECORD.

[ESTABLISHED, 1878.]

Vol. XXVII

Published every Thursday at  
39-41 Wade Bldg by the  
Marine Review Pub. Co.

CLEVELAND, O., FEB. 26, 1903.

Eastern Office, 1023 Maritime Bldg., New York City  
Chicago Office, 373 Dearborn St.

[Entered at Cleveland Post Office as second-class matter.]

Subscription \$3.00 year.  
Foreign \$4.50 year.  
Single Copy 10 cents.

No. 9

## DELAY IN WARSHIP CONSTRUCTION.

President Roosevelt has been investigating the delay in the construction of warships at the various ship yards. He has held a number of interviews with the secretary of the navy on the subject and this week authorized the publication of the following statement:

"The matter of the delay in the completion of vessels of the navy now under construction has been the subject of an interesting correspondence between the president and secretary of the navy. Much comment has been caused by the fact that so many vessels have run over contract time, and by many months. Under date of Feb. 14 the president called the matter to the attention of the secretary of the navy. The secretary's reply with the accompanying statement by Admiral Bowles, chief constructor, covers the subject exhaustively and shows that while through a number of causes the building of war vessels has been delayed and the dates of their completion have been and will be considerably beyond the dates originally set, naval construction in the United States is not materially behind the naval construction of England and Germany in the matter of time."

Admiral Bowles in his report says the delays in construction may, in general, be attributed to one or more of seven causes which, in brief, are as follows:

"First—Inadequate plans, due to the great haste in preparing plans in order to get the ships under contract as soon as possible after congress authorizes them. This is now overcome by the demand of congress that plans shall be completed before it authorizes ships.

"Second—Changes in the disposition of armor or armament, or in the details of the designs after the award of the contract—simply a corollary of the first cause.

"Third—Delays in delivery of armor and ordnance, due to the development of improved but tedious processes, long controversies over prices and the limited capacity of armor plants.

"Fourth—Delays due to governmental inspection, it being claimed that the inspection given to United States war vessels and their material is more complete than that given by any other nation.

"Fifth—Delays due to slowness of delivery of steel and other structural materials by subcontractors, which is attributed to the phenomenal demand since 1898 throughout the world for ordinary commercial grades of structural material, which taxes the capacity of manufacturers, who are therefore reluctant to furnish the very high grade products demanded for naval work, the higher quality being not only difficult to make, but less profitable.

"Sixth—Delays due to inadequate facilities or insufficient ability in the contractors' technical staff, the blame in this case being laid on a construction of the law compelling an award to the lowest responsible bidder, and to the policy of so awarding contracts as to encourage small plants to enlarge their facilities; also, in part, to the unsatisfied demand throughout the country for skilled technical assistants.

"Seventh—Delays due to an inadequate supply of skilled workmen, resulting from the withdrawal from the merchant service for the auxiliary navy and for army transports in 1898 of a large part of the registered American tonnage, the replacing of which created a ship building boom, only now falling off owing to the failure of the subsidy bill."

## OIL FUEL TESTS ON BOARD SHIP.

In many yards, both in this country and abroad, where steamships are built or repaired, announcement of widespread preparations are being made to install oil-burning apparatus. The latest step in this direction was the recent cable announcement that some vessels of the British navy have started on a cruise burning nothing but oil, including battleships and cruisers.

All around New York are to be found ships with the new equipment. One of the vessels which is being transformed is the British Queen, which was so much damaged in the second Hoboken fire that she has been under the hands of the carpenters ever since. Another is the Washtenaw, a tramp of 2,003 tons. A small fleet of coastwise traders has been turned into an oil-burning merchant squadron already, and the Standard Oil Co. is also conducting elaborate experiments.

The Red Star liner Kensington was the first great steamship to cross the Atlantic with oil fuel, making the trip between here and Antwerp last fall. Beyond saying that the preliminary test was successful, the officers of the International Navigation Co. made public no details of the experiment, stating that they would do so after some more voyages had been made. The Kensington went out of commission temporarily about that time, and so the additional trips are yet to come. The oil was used in the forward

burner, a "single ender," and the flames were applied to the tubes through jets placed at intervals under the boilers. Chief Engineer Perrie was in charge and reported that all the defects evidenced in a previous unsuccessful test had been overcome. The officers of the company, after an investigation, admit that the experiment tended to show that oil was destined to occupy a prominent place as fuel. It is learned that careful comparative tables to show the difference in results obtained from coal and oil were made out each day of the trip, but the figures are being withheld until they have been substantiated further.

The single-ended boiler of the steamship had four furnaces, and the reason the initial experiment was not more extensive was that the vessel was fitted with the induced system of forced draft, which had not had apparatus for burning oil successfully adapted to it. The Kensington, which is a sister ship of the Southwark and of 8,669 tons displacement, is expected to solve the problem finally on her next few voyages.

Among oil-burning vessels which have left New York recently is the Anstice, which started for Texas after her coal bunkers had been supplanted by oil tanks. The largest tug in the world, the Luckenbach, burns oil, and has been chartered by a Texas company to transport the new fuel up and down the coast, carrying her total capacity of 25,000 barrels each trip. She makes a speed of 14 knots an hour.

A steamship of 3,928 tons displacement, the Strombus, arrived in Boston from Cardiff, burning oil, soon after the Kensington's test trip from Antwerp to New York. The Strombus used about 30 tons of oil a day and it was stated that 40 tons of coal a day would have been required to maintain the speed she made. It is a question of much difference of opinion among steamship men as to whether coal will be replaced altogether by oil as fuel used for transoceanic travel, and even those who argue affirmatively admit that final proofs have not been forthcoming. On the other side, it is argued that the great recent demand for oil-burning vessels has been due almost altogether to the Texas trade, and that vessels engaging in this trade, being enabled to get oil at special rates naturally could better afford to burn it, whereas the general purchaser might not find it as economical as coal.

## FUEL OIL ON PACIFIC STEAMERS.

It is claimed that oil will soon replace coal as fuel on nearly all of the Pacific steamers if tests now being made on the Pacific Mail line prove successful. All of the Oceanic Steamship Co.'s steamers will soon be refitted with oil burners, so successful have been the results with the Alameda and Mariposa. These two steamers are of 3,000 tons burden and run to Honolulu and Tahiti. The Sierra, Sonoma and Ventura are soon to be taken off the Australian run for the purpose of refitting them with oil burners. On the recent record-breaking trip of the Korea from San Francisco to Honolulu, when the record was lowered over six hours, two experts were on board with a view to acquainting themselves with the working of the vessel and to ascertain what is needed to make her into an oil burner. On the steamers where the oil has been tried it has been found to be more economical, and there is hardly any more danger than with the use of bituminous fuel. The Pacific Mail company is now considering the use of oil on the Korea, and it would not be surprising if a change were made upon her return from the orient.

## JOINT HIGH COMMISSION MAY RECONVENE.

It is learned that Senator Fairbanks has addressed Sir Wilfred Laurier respecting a reconvention of the joint high commission in pursuance of the program outlined when the Alaskan boundary treaty was ratified. Sir Wilfred and Senator Fairbanks are respectively the chairmen of the joint commission and when that body adjourned in 1900 it was with the understanding that it could be reconvened only by the mutual agreement of the two chairmen.

The Alaska boundary was the rock upon which the commission split at its last meeting. Now it is the purpose, the boundary matter having been eliminated by arrangement to submit it to a special commission, to take up again and adjust the same propositions that were under consideration when the joint high commission adjourned. One of the propositions in which the state department is most interested is that relative to lake ship building and it is hoped that an arrangement can be made by which the United States navy can profit by the splendid resources of the lake ship builders, the probable basis being a strict limitation upon the period of time that newly constructed naval vessels may remain in the lakes after completion and perhaps a requirement that their guns be placed only after they are in salt water.

## GENERAL REDUCTION IN WAGES.

**British Ship Builders are Demanding it, and the Situation Among Labor Unions is Threatening—Glasgow Shipping Letter.**

Glasgow, Feb. 12, 1903.—The labor trouble in the ship building trade is now in full swing, and is awakening increasing anxiety. This week the Clyde Federated Ship Building Employers have been receiving delegates (including the head officials of the society) of the Boilermakers & Iron Ship Builders, the Blacksmiths, and other organized trades. The Engineering Employers have already interviewed the representatives of the A. S. E. and the Machine-Workers' Union, who after considering in their several district branches have decided to call for a conference of the central authorities of the Employers Federation and the Allied Trade Unions, in accordance with the terms of agreement under which the strike of 1898 was brought to a close. The Federation of Engineering Employers is not the same organization as the Federation of Ship Building Employers, though many firms belong to both federations. And the trouble is more likely to be with the ship yard workers than with the workers in engine shops, who would, however, be involved if the ship yards come to a stop. In the north of England the Ship building employers have plainly intimated that they will close their yards if all the trade unions do not concur in the reduction of wages. The same course will doubtless be adopted by the Scotch ship owners, although they have not yet made any announcement to that effect. They have not had any occasion to do so, because none of the trades has yet positively rejected their terms, however much they may have argued against them. It is, however, feared that in Scotland as in the north of England, the obstacles will be the members of the Carpenters' and Joiners' Society and of the Plumbers' Trade Unions. These organizations have the majority of their members employed in other trades than ship building, and they outvote a reduction in the wages of those of their members who work in the ship yards in case that is made a precedent for a reduction in all the other trades also.

The position taken up by the Scotch ship builders in their conferences with the several trade unions, collectively and separately, is this: They say that the industry has got into a depressed and is getting into a stagnant condition because the cost of ships is now too great to admit of a commercial profit being made by ship owners at the current range of freights. Liners and special craft are ordered as required, irrespective of freight markets, but such orders go only to a very limited number of yards and do not affect the depression in the majority of the yards. That depression can only be removed by a renewal of the demand for ordinary ocean freight-carriers. Such demand can only be revived by a material reduction in the costs of producing new ships. As far as capital can do so such reduction has been made, and material also is lowering in price. But the main item in the cost of producing a ship is labor, and there is no hope of improvement in demand until the cost of labor is reduced. The amount of reduction asked for is only 5 per cent. but the employers say that the reduction must be throughout every branch of labor in the industry. It will not do for one set of men to concur and others to hold off. The employers place all the trades on the same basis, and the inference is that if any one of the trades refuse to comply a halt will be called. This has not been declared, but I fancy the men pretty well understand the position, and that is the reason they ask for a conference between the two federations—that of capital and that of labor. The Federation of Trade Unions is not empowered to make collective wage bargains, but it was hoped by a composite meeting to fix upon a common line of action. As a matter of fact, however, each trade union concerned is considering its own paces. It should be mentioned that while the ship yard workers have had four advances since 1895, and in 1898 reached a scale above anything they had ever had previously, they have not had a single reduction since the trade began to decline. The wages now current have been unchanged for four years, although the percentage of unemployed men is very much greater. There are now about 20 per cent. fewer men employed in the Clyde ship yards than a year ago.

## CORPORATION GAINING GROUND.

The annual meeting has just been held here of the British Corporation for the Survey and Registry of Shipping, under the presidency of Mr. Francis Henderson of the Anchor line. This corporation has now been twelve years in existence. During 1902 the tonnage of the vessels which were built exclusively to the corporation's class and rules showed an advance of about 25 per cent. over those completed in 1901, and reached a total of over 135,600 tons. The number of vessels building at present to the British Corporation class is well maintained, and includes three 10,000-ton steamers for the P. & O. Co., two large vessels each for the City, Hall, Wilson, Clan, and Anchor lines, as well as vessels for P. Henderson & Co.'s Rangoon line, the Union Steamship Co. of New Zealand, Bowring & Co., the Clyde Shipping Co., Hogarth & Co., and several other important firms. While the work of the past year was as remarkable for its variety as in previous years of their history, including as it did towing steamers, tramp vessels of all sizes, turret steamers, and passenger vessels, ranging from the twin-screw Princess Vic-

toria, of 1600 tons, for the Canadian Pacific railway, to the twin-screw Columbia of 8,300 tons, for the Glasgow and New York trade; perhaps the most distinctive feature of the year had been, the president said, the number of single-deck vessels with the machinery placed at the after end, which by reason of the absence of beams and other obstructions in their holds, the large number and size of the hatchways, and the innumerable facilities for handling cargo rapidly, can load and discharge large cargoes in a manner never previously attained. These vessels might be regarded as an evidence of willingness to learn from others, and to adapt to our own purposes here the methods in regard to the rapid handling of cargo, which our American friends have found so successful in their vessels employed on the great lakes and elsewhere. Some of the vessels mentioned were, as a matter of fact, for American account, but the most remarkable case was that of the steamship Mercedes, of 4,300 tons, belonging to Christie & Co. of Cardiff, which in addition to these exceptional facilities for working cargo possessed the great advantage of being a self-trimmer, and had also the top corners of her structure as well as the double bottom adapted for water ballast, thus enabling her when necessary to proceed from one port to another without cargo with greater safety than would otherwise be possible.

Some interesting remarks on the subject of riveting have been made by Mr. A. Denny, the ship builder. He is chairman of the technical committee of the British Corporation, whose staff are now engaged in preparing for a revision and extension of the rules. The modern vessel, he said, was not only increasing in size, but the ratios of length, breadth and depth were changing. In regard to the increase in actual size, this meant not only increased scantlings, but increased size of rivets and increased care in laying up these larger rivets. It was a question whether the limit of size of rivet which could be driven by hand had not been reached. Machine riveting on the shell of steamers was understood to have been successfully accomplished in America, and while the shell had not been attacked here, some progress had been made in internal work, and there was no reason why this should not be extended to the shell, with the assistance of the men. The machine riveting would also allow of a greater use of steel rivets, which Mr. Denny thought would be very advantageous in large ships. The committee in the revision of the rules would take care to embody the result not only of the experience gained in vessels classed with them, but, having many ship builders on the committee, they had information of other vessels also at their disposal, and they would take care that while avoiding anything in the nature of panic legislation, ample provision would be made for the increased strength necessary for the larger vessels.

## COMPETITION FROM FRENCH BOUNTIES.

The president of the Clyde Sailing Ship Owners' Association at a meeting of the society this week, discussing crimping in Portland, Ore., said he found that this practice was as bad as ever, but they were trying to get the other associations to join them in making a test case. Their friends on the other side advised them that this was the only way to put a stop to it.

President Clink also dwelt at length on the competition of French sailing ships supported as they are by bounties. These French bounties are, no doubt, a prominent cause in the depression of shipping. According to Lloyd's Index for Jan. 22 there were twenty-three French ships at or bound for North Pacific ports, while no fewer than thirty were on their way from there to the United Kingdom or continent, and eleven were bound from the same ports to the Cape of Australia. The French law on the subject of bounties was altered April last, when the government confirmed the construction bounty to builders of all iron and steel ships and of all wooden vessels. The rate of this bounty is 65 francs per ton for iron or steel ships, 40 francs per ton for wooden ships of 150 tons and over, 30 francs per ton for wooden ships under 150 tons, 150 francs per 1,000 kilogs. for engines, boilers, etc. Notwithstanding this French-built vessels are about 35 per cent. dearer than British-built vessels. Owing to the large bounties for navigation paid to the owners they seem to be able to afford these prices. Under the new law a sailing vessel gets 1 franc 50 centimes per gross ton per 1,000 miles for the first year, with an annual reduction of 2 centimes for the first four years, 4 centimes for the second four years, and 8 centimes for the third four years. Up to 600 tons the bounty is paid in full; for every 100 tons (or part of 100) over 600 tons the rate of initial bounty is reduced 10 centimes, and the bounty given to a vessel over 1,000 tons is the same as that to which a vessel of 1,000 tons was entitled. A vessel of 1,000 tons or above would receive 1 franc 30 centimes instead of 1 franc 70 centimes per ton per 1,000 miles the first year. The payments continued for twelve years. While the new law reduced the bounties to sailing ships it increased them to steamers. French-built steamers have the right for each voyage to choose between the outfit bounty and the navigation bounty. The outfit bounty (compensation d'armement) is payable for every day the roll of the crew is complete, but it is limited to a maximum of 300 days in the year. The amount payable varies from 5 centimes per ton per day to 2 centimes per ton per day according to the size of the steamer. This bounty also applies to foreign-built steamers above 100 tons gross sailing under the French flag,

engaged in the ocean and international coasting trade. The navigation bounty (prize de navigation) is paid per gross ton per 1,000 miles as follows: For steamers of 1,000 to 3,000 tons, 1 franc 70 centimes. The allowance diminished as the vessel increased in size. This is for the first year, after which the rate diminishes annually 4 centimes for the first period of four years, 8 centimes for the second period of four years and 16 centimes for the third period of four years. But under this new law not a single French steamer was ordered until Oct. 9 last. Various orders then came forward and Dec. 17 all the available bounty had been taken up. Under the present law French owners paid large prices in the hope of earning the bounty for twelve years, but the ship might be lost on her first voyage, and owners could not sell their vessels to advantage except to French subjects as the bounty is only paid to ships owned and manned by Frenchmen. There were 59,000 tons of steamships under construction in France at the end of 1901, and 77,000 tons at the end of 1902.

Referring to these facts, President Clink said that this state of matters revealed a kind of competition which was difficult to meet. It was suggested by some that their ships should be subsidized by government, and by others that every foreign subsidized ship touching at ports in the United Kingdom, colonies, or dependencies should be made to pay a countervailing tax, but, in his opinion, the only practical remedy was to lighten the burdens imposed on British shipping by parliament, and relieve ship owners from many irritating and useless legal provisions. He was glad to notice that the select committee on steamship subsidies recommended the remission of all light dues. He hoped that parliament would not be long in giving effect to this. He thought the law ought to be altered so as to protect British owners. He also hoped that all foreign vessels trading or going from or between any place or places in the United Kingdom or any British possession would be subjected to all the provisions of the merchant shipping act as were British vessels.

Mr. William Law of the Glasgow "Shire" line of sailing packets, said that the decrease in the tonnage, which was a marked feature in the returns of sailing ships of recent years, had almost ceased. For example, in 1901 there was a decrease in the registered sailing tonnage of the world of 126,000 tons, whereas last year the decrease only amounted to 1,000 tons. These figures showed that while the British ship owners are still getting quit of their sailing ships—the decrease in the United Kingdom last year being 65,000 tons—foreigners are buying and building to an extent that was keeping the tonnage stationary. The sailing tonnage built in the United Kingdom last year was 49,352 tons, being more than double that of the preceding year, while in France the sailing tonnage built totalled 141,329 tons, including fifty-four vessels of 2,000 tons and upwards. It is worthy of note that there are now only 8,214 tons of sailing tonnage building in France, which shows that the bounty is now reduced to a point offering little or no inducement to French ship owners to build for it. While British ship owners generally still evidently believed that ships of 2,000 to 3,000 tons register were large enough for all purposes, foreigners, or some of them at least, had faith in size, and during 1902 the largest sailing ship ever built was put into the water from one of the American yards, a steel schooner-rigged, seven-master of 5,218 tons register. This was closely followed by a German ship of 5,081 tons register.

The new steamer Bharata, built by Scott & Co., Greenock, for the British India Co., has sailed for the east after having satisfactorily completed a series of official trials under extremely adverse weather conditions. The speed obtained on deep-load trial was 15 knots, and a thorough test of the vessel's sea-going qualities was made, which proved satisfactory to owners and builders alike, the smoothness of working of the machinery and the entire absence of vibration being specially commented on. The Bharata, with other recent Clyde vessels, is to develop the passenger and mail traffic between Calcutta and Rangoon.

#### CALLING FOR REMOVAL OF LIGHT DUES.

On the burning question of lighthouses and light dues, the secretary of the North of England Protective Association, which represents over 2,000,000 tons of shipping and £25,000,000 of capital, has addressed the following letter to the president of the board of trade: "I am requested by my directors to inform you that at the annual meeting of this association, which was held at Newcastle on the 27th ult., the resolution of the special committee of 1845 on lighthouses and the recommendation of the select committee of 1860 were fully discussed. The memorandum issued by the Trinity House, under date of July 15, 1902, and the recent recommendations of the Shipping Subsidies Committee on this subject, were also carefully considered, and it was pointed out that as previous to the repeal of the navigation laws ship owners were 'subjected to various burdens which would never have been imposed upon them had they not been a protective class,' these burdens should have been removed when British ship owners ceased to be protected. Instead of this fresh liabilities and restrictions have been enforced, some of which are dealt with in the enclosed section of our 'suggestions,' and, pending the adoption of other measures, by which British shipping may be able to compete for the carrying trade of the world on something like equal terms, it was unanimously resolved:

"That, in consideration of the encouragement given by other countries to their shipping industries, no further time should be lost in commencing to free British ship owners from the disabilities under which they labor, and that effect should at once be given to the recommendations made by the select committees of the house some fifty or sixty years ago, viz.: 'That the lighting of our shores is a high imperial duty which we owe not merely to ourselves, but to strangers whom we invite to trade with us. That all expenses for the erection and maintenance of lighthouses, floating lights, buoys and beacons on the coast of the United Kingdom be henceforth defrayed out of the public revenue.'

"My directors also submit that the superintendence and management of lights, buoys and beacons on the coasts of Great Britain and Ireland should be transferred to the board of trade, with the assistance of committees representative of the shipping, navigation, and trade of the country."

We are a good deal interested here in the efforts and proposals to solve the problem of the port of London. On this subject I draw attention to the following declaration by Mr. C. J. Cater Scott, chairman of the London & India Docks Co.: There can be no objection to the principle, he says, to a single public authority being established for managing the river, including the duties of the Waterman's Company, but the docks should be excluded from management by the port authority leaving them to be carried on as commercial undertakings with a fair and wholesome competition with the riverside accommodation. The dock companies ought to be provided with amended revenue powers on goods discharged in the docks sufficient to insure the raising of capital for new works and equipment that may be necessary from time to time for the accommodation of the trade. In return the companies would agree (1) to a limitation of dividend, (2) to a reduction in the maximum dues on shipping from 1s. 6d. to 1s. (as against a maximum of 1s. 6d. recommended by the royal commission), (3) to be placed under the jurisdiction of the railway commissioners as to the reasonableness of their non-statutory charges, (4) the companies would also be willing to be made liable to be called upon by the port authority (subject to appeal to the board of trade) to execute such works of improvement in the docks as may be thought by that authority to be necessary. Such a scheme, whilst in many respects carrying out the recommendations of the royal commission, would remove the difficulty as to competition with private interests which evidently pressed upon the royal commission. It would constitute one supreme authority for the port, with the existing dock companies practically as managers of the docks, thus, in effect, adopting the suggestion of the royal commission as to the formation of a statutory dock committee to manage the docks. There would be no need for any large financial scheme in connection with the purchase of the dock companies' undertakings, nor any necessity to have recourse to local or imperial taxation. Moreover, the financial position of the companies would be so far stereotyped as to render their purchase by the port authority a comparatively simple matter, should circumstances hereafter render that course practicable and desirable.

#### PRODUCTION OF PIG IRON IN CANADA.

The American Iron & Steel Association has received, direct from the manufacturers, statistics of the production of pig iron in Canada in 1902. They show an increase of 74,581 gross tons, or over 30 per cent. as compared with 1901. The total production in 1902 amounted to 319,557 gross tons, against 244,976 tons in 1901 and 86,090 tons in 1900. In the first half of 1902 the production was 157,804 tons and in the second half it was 161,753 tons, a gain of only 3,949 tons. Of the total production in 1902, 302,712 tons were made with coke and 16,845 tons with charcoal. A little over one-third of the total production was basic pig iron, namely, 107,315 tons. The Bessemer iron made amounted to about 9,000 tons. Spiegeleisen and ferromanganese have not been made since 1899. The following table gives the total production of all kinds of pig iron (including spiegeleisen and ferromanganese) in Canada from 1894 to 1902. Prior to 1894 the statistics of pig iron production in Canada were not collected by the American Iron & Steel Association.

Years.	Gross tons.	Years.	Gross tons.	Years.	Gross tons.
1894..	44,791	1897..	53,796	1900..	86,090
1895..	37,829	1898..	68,755	1901..	244,976
1896..	60,030	1899..	94,077	1902..	319,557

On Dec. 31, 1902, the unsold stocks of pig iron in Canada amounted to about 20,000 gross tons, as compared with 59,472 tons at the close of 1901 and 12,465 tons at the close of 1900. Of the unsold pig iron on hand on Dec. 31 over 19,000 tons were coke pig iron. On Dec. 31, 1902, Canada had fourteen completed blast furnaces, of which seven were in blast and seven were idle. Of this total nine were equipped to use coke for fuel, four to use charcoal and one to use mixed charcoal and coke. In addition four coke and two charcoal furnaces were being built or were partly erected on Dec. 31, but work on several of the furnaces was temporarily suspended.

## NAVAL COALING STATIONS.

The growth of the navy can be followed in the growth of the coal bill. In the year ending June 30, 1892 the United States paid \$550,451 to supply the naval vessels with coal. Last year the bill for coal on board ship was \$2,220,201 and in addition \$750,000 was spent on coaling stations. About three-fourths of the coal consumed by warships is from domestic sources; the balance is foreign coal. Some interesting facts are observed with regard to the naval coal supply. It is found, for example, that it is cheaper to buy Cardiff coal, duty paid, in San Francisco than to ship our own coal from Atlantic ports around Cape Horn to supply our vessels on the Pacific station. The bureau of equipment in the navy department has made agreements in sixty-one foreign ports all over the world to supply our naval ships with coal at less than current rates. These arrangements were begun three years ago and are found to be both convenient and economical. All the large navies of the world have adopted this method of increasing their facilities for coaling warships.

We have fourteen coaling stations on the Atlantic and Gulf coasts from Frenchman Bay, Me., to New Orleans. The only coaling station on the south Atlantic coast is at Port Royal, S. C. The construction of the coal depot at the Brooklyn navy yard has made slow progress, but is now nearly completed. A pier runs out from the Cob dock into the East river upon which a coal pocket with a capacity of 9,000 tons will be situated. A vessel of any size may be docked on either side of the pier and receive coal from the pocket by gravity.

Coal will be distributed throughout the navy yard by means of cars which will be run under the pocket and loaded by gravity. It will take some time to build the pocket, but the contract has been let. A large amount of coal will have to be kept on hand; the 9,000 tons which the pocket will hold would go only a short way toward supplying squadrons that may rendezvous in this harbor. Our new battleships and armored cruisers have a capacity of 2,000 tons each, while the older ships of these types can carry on an average 1,500 tons.

We have five coaling stations on our long extent of Pacific coast. They are situated at San Diego, San Francisco, the Puget Sound naval station, Sitka and Dutch harbor on Unalaska, one of the Aleutian islands.

Twenty acres of land has been transferred to the navy department at Dutch harbor for its coal depot. The water is deep, the site is excellent for the purpose, and a wharf and coal depot, with a capacity of about 5,000 tons, are to be built. The fact may not be generally known that the war department is about to fortify both Sitka and Dutch harbor.

The coal storage plant now building at the Puget Sound naval station will have a maximum capacity of 20,000 tons of coal. As no good coal is obtainable on the Pacific coast it is necessary to transport all the coal used by our warships on that station about 15,000 miles by water. Among other insular naval coal stations, San Juan, P. R., is one of the most useful, supplying coal and water to a large number of ships of the navy, particularly during the winter months. San Juan is anything but an ideal coaling station, as it can be used only by ships of small or medium size. Larger ships are prevented from entering the harbor by shoal water at the entrance.

It has been regarded as very unfortunate that we had no other coaling station in the West Indies, and the chief desirability of buying the Danish islands was the fact that St. Thomas offered ideal conditions for a coaling station. Now that Cuba has agreed to let us have coaling stations on the island we will be very well equipped in this respect in the West Indies.

The storage capacity at our depot in Honolulu has been increased to 30,000 tons and it is intended to keep the depot in good condition as it will be several years before the proposed naval station can be established at Pearl harbor. A while ago there was a coal famine at Honolulu and several mail steamers and also sugar plantations were supplied with coal from the naval depot. It was fortunate that this service could be rendered, for otherwise the steamers would have been obliged to lay up and the cane crop would have been ruined for lack of fuel to run the machinery.

Pago-Pago bay in Tutuila islands, Samoa, is now a naval station and an appropriation is being made to extend the capacity of the coal depot, the present steel shed holding only 5,000 tons. The improvements will include better appliances for handling coal and larger storage capacity. The port of Pago-Pago is the most valuable in the south Pacific. It is rapidly increasing in importance and is already a port of call for the regular line of steamers between Australia and San Francisco.

The retention of Guam as an American possession after its capture was for the express purpose of establishing a naval coal depot. As yet the appropriation for the improvement of the port of San Louis d'Afra has not been made because, though passed in the senate, it failed in the house. The improvement will certainly be made before long as with the completion of the Isthmian canal, Guam will become an important commercial port of call.

A large and commodious naval coal depot at Cavite, in Manila bay, is now building and will be fitted with all modern appliances. Seven other sub-depots have been established at various ports of the Philippines, including Cebo and Iloilo.

## SHIP BUILDING AT BATH.

Ship building in the Bath district continues with unabated vigor, all the ship yards having quite as much as they can reasonably attend to. At the Kelley-Spear Co.'s yard the four-masted schooner building for Capt. Gorham of Round Pond is all planked and the work of finishing her up is well along. The masts will be stepped this week. The craft will bear the name of Cohasset and will probably launch the last of this month. The keel is stretched and the stern post up for a four-masted schooner for Capt. Elzey of Bethel, Del. Workmen are molding out the timber and work will be rushed as soon as the Cohasset is launched. This schooner has a 170 ft. keel and will be 37 ft. beam and 13 ft. deep. The stern post is up and keel stretched for a barge for New York parties, which will be hurried along as fast as the timber arrives from Northern Maine and Canada.

At the yard of the New England Ship Building Co. the four-masted schooner building for Capt. S. C. Thompson of Mattawan, N. J., is all framed, sealed, her deck laid and ready for planking. This craft is 181 ft. long, 39 ft. wide and 18 ft. deep. She will slide into the Kennebec some time in April. The barge building for the Baltimore & Boston Barge Co. is half framed. She will be 220 ft. long, 39 ft. wide and 18 ft. deep.

At the ship yard of Arthur Sewall & Co., Bath, Me., the only thing on the stocks is the five-masted steel schooner to be managed by the firm. She is all plated with the exception of two plates and riveters are very busy closing her up. The houses have been constructed and the work of laying a wood deck over the steel one is progressing rapidly. The deck will cover every portion of the craft and will be made of 4 by 4-in. pine. There is considerable work to be done before the steel masts can be stepped. They are lying in the yard all ready for use, as is the big bowsprit.

At G. G. Deering's yard the five-masted schooner being constructed for the firm is all planked and cemented and painters are doing their work. The masts will be all in within a week and then riggers will hustle the craft to completion. She will be commanded by Capt. J. E. Ross of the schooner Edward E. Birry, who has an excellent reputation and is an able master. She will probably take her maiden plunge the first of March.

At Crosby's yard the four-masted schooner building is well under way. She will be a duplicate of the Frank T. Stinson. The Stinson was the first vessel built by Mr. Crosby and was constructed in the Keed yard in 1887. Her dimensions are 185.8 ft. length, 38.2 ft. beam, 18.2 ft. deep, 994 tons. She is now in service in the J. S. Winslow fleet of Portland. The last vessel built in the Reed yard was the four-master Cordelia E. Hayes of the Percy & Small fleet, launched in August of 1901.

At Percy & Small's yard, Bath, Me., the four-masted schooner under construction is all framed and half planked. She will probably go overboard some time in March.

At the Bath Iron works the battleship Georgia is three-fourths framed and about forty plates have been put in position on her deck. The oil barge Shenango for the J. M. Guffey Petroleum Co. is to be launched on Mar. 18. She is 305 ft. long, 44 ft. wide and 22 ft. deep. The caisson for the Kittery navy yard is all framed and plated.

## WANTS GUNBOATS RETURNED.

The bureau of navigation has recommended to the assistant secretary of the navy that steps be taken to withdraw from the various state militias the vessels loaned to them by the government. This action grew out of the request of the state of North Carolina for the return of the converted gunboat Hornet which had been turned back to the government by the state because the state could not keep it in repair. The Hornet is now being fitted out as a tender to the receiving ship Franklin.

"The work that these small vessels do," the bureau says, "is of the greatest value to the navy, especially at this time, when the deficiency in properly trained men is great, and the bureau is decidedly of the opinion that it would be very detrimental to the service to withdraw the Hornet from this duty."

It then recommends that the government secure the return of the following vessels now loaned to the respective states named: From Massachusetts, the Inca; Connecticut, Elfrida; New York, Aileen; New Jersey, Huntress; District of Columbia, Oneida; Maryland, Sylvia; Louisiana, Stranger; Ohio, Hawk; Illinois, Dorothea.

At a banquet recently given in his honor at Collinwood, Ont., Sir William Muloch, the postmaster general, speaking of foreign trade said that no country could be great unless identified with commerce beyond its limits; that Canada has no neighbors on this continent with whom she can trade and that therefore she must trade with countries beyond the seas. The foreign trade of Canada last season was \$414,431,881, of which \$166,526,283 is credited to Great Britain and \$192,012,434 to the United States. The merchandise which entered Canada for consumption was \$202,791,595, of which Great Britain supplied \$49,206,062 and the United States \$120,814,750. Sir William Muloch's statements are not supported by facts.

## WIRELESS TELEGRAPHY MAY BE REVOLUTIONIZED.

In its last issue the Electrical Review describes a new apparatus invented by Peter Cooper Hewitt, which some of those who have examined it say will make a revolution in methods of sending wireless telegraph messages. The device consists of a glass globe, about 10 in. in diameter, having two tubes containing mercury sealed into the bottom of the vessel. This apparatus acts as a powerful and effective interrupter, and takes the place of the spark gap now used in discharging the condensers for setting up electrical waves. It enables powerful, rapid and continuous oscillations to be set up in the antenna, or sending mast, used in transmitting wireless messages, and not only enables messages to be sent over very great distances with ease, but permits secrecy to be maintained which heretofore has been impossible.

The operation of this device depends upon two new phenomena in physics, which have been discovered by Mr. Hewitt in the course of his researches. The first is the resistance of the mercury in the apparatus to a passage of current until a high potential has been applied; the second is the disappearance of this resistance after this high voltage has been reached. The effect of these two phenomena is to permit a condenser to be charged to a high potential, and then, by the disappearance of the resistance of the interrupter, to discharge it very rapidly. The result of this action is to set up violent and rapid current impulses in the circuit containing the condenser, and thence in the sending wire. These current impulses, being very powerful, will enable messages to be sent to great distances, and as the number of oscillations per second can be controlled, this permits of selective signalling. The number of impulses per second can be made very high—above 1,000,000 per second if desired. The device is inexpensive, and it is said that there is no appreciable deterioration in it, so that it has a long life.

Dr. Michael I. Pupin, professor of electromechanics at Columbia university, and well known as the inventor of the Pupin system of long-distance and submarine telephony, is much interested in the Cooper Hewitt mercury vapor interrupter and made the following statement of his estimate of the value of the new device:

"I have watched the development of the Cooper Hewitt mercury vapor tube as an interrupter from the very beginning. The present operation of the device comes up to my highest expectations, and in my opinion it is one of the most important discoveries in physics which has been made during the last ten years. The operation of the tube as an interrupter depends upon two new elements in the character of the cathode resistance of the vacuum tube—first, the disappearance of this cathode resistance as soon as the impressed voltage has reached a certain value; second, its sudden reappearance as soon as the current strength through the tube has fallen below a certain small value. These two elements are entirely new, and they form one of the prettiest discoveries which Mr. Hewitt has made in the course of his investigations.

"I do not know of any other case where a physical discovery found such a rapid practical application, and this is due to the fact that physicists experimenting in the domain of electrical waves, and electrical engineers engaged in the development of wireless telegraphy, were waiting for a current interrupter possessing the very characteristics which the Cooper Hewitt tube possesses in consequence of the two novel elements referred to above.

"To illustrate this it is sufficient to refer to the needs of wireless telegraphy which the mercury vapor interrupter seems to satisfy. It is perfectly evident today that wireless telegraphy will not make any essential progress until a method is discovered of generating very powerful and persistent electrical waves. They must be powerful in order to overcome distance, and they must be persistent to enable us to employ the methods of selective tuning. The Cooper Hewitt mercury interrupter is capable of furnishing just such kind of electrical waves, and there is no other interrupter which comes anywhere near it in this respect. I do not think that I am saying too much when I state that the contribution which this development will make to wireless telegraphy is by far the most important which has been made since Marconi's earliest experiments, which demonstrated the practicability of transmitting electrical energy without wires to a distance of over twenty miles by employing two upright wires, each grounded, and impressing on the sending wire electrical oscillations such as Hertz employed in his classical experiments.

"The early experiments by Mr. Marconi were a revelation to physicists, not because they contain any physical novelty, but because they demonstrated that by a certain arrangement of receiving and transmitting conductors the waves generated could be felt at such a long distance. I think it will be admitted on all sides that since the time of Marconi's early experiments, no new knowledge with regard to the method of generation or transmission of the electrical waves has been offered to those who are engaged in the practical development of wireless telegraphy, so that today wireless telegraphy is practically in the same condition in which it was in 1896. The Cooper Hewitt mercury vapor interrupter is the first contribution which possesses extraordinary novelty, and which on account of its peculiar properties is the very thing needed in order to extend wireless telegraphy with a single

stroke away beyond its present limits. How far this extension will reach I am not prepared to say, but that it will be far-reaching there is not the slightest doubt in my mind."

## ANNUAL MEETING STANDARD CHAIN CO.

At the annual meeting in Jersey City last week of the stockholders of the Standard Chain Co., whose main offices are in Pittsburg, President John C. Schmidt read his annual report showing a very satisfactory condition of affairs. The following directors were elected for the ensuing year: John C. Schmidt, Charles H. Hayden, Robert Garland, J. T. Davis, A. S. White, Franz Krein, Eli Attwood, Peter Wertz, Frederic F. Culver, Charles A. Painter, George S. Schmidt, F. W. Prentiss and Oscar L. Gubelmann. Out of a possible 22,946 votes, 20,706 were cast for each director above named. At the subsequent directors' meeting the following officers were elected: John C. Schmidt, president; Robert Garland, vice-president; J. T. Davis, general manager; Franz Krein, assistant general manager; Wm. Robertson, treasurer; W. R. Dawson, general sales agent. Executive committee: John C. Schmidt, chairman; Robert Garland, J. T. Davis, Franz Krein and Peter Wertz.

Following is the condensed balance sheet for Dec. 31, 1902:

ASSETS.	
Real estate, plant, buildings and machinery.....	\$2,461,308.93
New construction .....	176,506.00
Common stock in treasury .....	10,000.00
Accounts and notes receivable .....	\$261,854.17
Materials and supplies, including furniture and interest and insurance paid in advance .....	463,944.28
Cash .....	10,376.04
	736,174.49
Total .....	\$3,383,989.42
LIABILITIES.	
Capital stock: Common .....	\$1,277,200.00
Preferred .....	1,031,400.00
First mortgage bonds: Issued .....	\$700,000.00
Less, redeemed and canceled. \$ 40,000.00	
Treasury bonds .....	113,000.00
	153,000.00
Accounts payable .....	\$132,369.92
Bills payable .....	151,000.00
Bond interest accrued (not due).....	12,780.00
	547,000.00
Total liabilities .....	\$3,151,749.92
First mortgage bonds, premium account.....	6,329.98
Surplus .....	225,909.52
	296,149.92
Total .....	\$3,383,989.42

## NEW YORK NOTES.

Mr. H. B. Roelker, consulting and constructing engineer, 41 Maiden lane, New York, lately completed the installation of an Allen dense air ice machine in twenty-three days' time on the steam yacht Riviera, the owner of which suddenly determined on a five or six-months' cruise to South America, Africa and the Mediterranean. A rush order for an Allen ice machine was therefore given and the time record for installation broken. The yacht left on her cruise a short time ago. Mr. Roelker is also placing similar machines in Mr. Hart's new yacht Constant, now building in Baltimore, and Mr. Chas. S. Bryan's yacht Czarina, building by the United States Ship Building Co. at the Crescent yards, Elizabethport, N. J. He also has under way in his shops fifteen of these machines, the majority of which are to be installed in old and new United States war vessels.

Capt. Howard Patterson, late of the United States navy and now president of the New York Nautical College, and Mr. George Crouse Cook, naval architect of 15 Whitehall street, and lecturer on naval architecture to the New York public schools, have formed a partnership under the firm name of Cook & Patterson, naval architects and engineers, and have opened offices at 130 Water street, New York. They purpose making a specialty of large steam yachts.

Ship building has been revolutionized three times during the past month. The latest to revolutionize it, according to the newspapers, is Prof. Keretschmer, chief constructor of the German navy, assisted by the kaiser. The ordinary type of vessel is entirely rejected and one substituted for it in the form of an aquatic bird. It is understood that by annihilating wave resistance the propelling capacity of the screw is augmented 50 per cent. It is stated that the new type of vessel will make no commotion or waves of any kind but will glide along the surface of the water with the easy motion of a duck.

Sawyer Bros. of Millbridge, Me., have sold the vessel that is now on the stocks at their yard, and which they expect to have completed in July, to Henry Lord of Bangor.



#### PRICES OF IRON ORE—LAKE FREIGHTS.

From present indications there will be nothing done regarding the coming season's lake freights for probably a month. This opinion is based mainly on delays encountered by the ore dealers in fixing prices of ore. It is safe to repeat the statement that there will be an advance in prices of ore (how much is not yet determined) and that shippers are believed to be willing to pay somewhat better rates of lake freight than they paid last year, but within the past week conditions have been encountered that prompt further delay and there is no disposition in any branch of the lake industry to hurry matters. The ore dealers found it necessary, principally on account of the contentions of Mesabi interests, to make a most rigid inquiry into the actual properties of the ores, both physical and chemical. The producers of Mesabi ores are desirous that the ores of that range shall be measured by their actual properties and shall obtain the current rate for ores of like quality. Hitherto there has been a sort of embargo upon the ores of this range. This labor of chemists, both with Bessemers and non-Bessemers, as it is expected there will be a "gentlemen's agreement" regarding the latter, will require ten days or more. Furnaces are expecting to pay an advance, realizing that the mining interests have not had the full share of profits which have attended the manufacture of iron and steel during the past few years.

Even after the prices of ore are fixed there will be a disposition among the vessel interests to await, if they can, a settlement of ore handling charges and other expenses connected with the operation of the ships. While it is true that they have not at all times in the past had a full knowledge of these expenses before making freight contracts, they profess a desire to be better informed on this score this year. The ore dock managers will not meet the longshoremen on the subject of wages until about the middle of the coming month. The executive committee of the Lake Carriers' Association will be prepared shortly to meet the representatives of the various unions for the purpose of adjusting wage schedules for the season, but this will be slow work. The subject is one which both sides recognize had better be approached with great deliberation, and there is every advantage in delaying the adjustment until the actual conditions under which the season's business is to be carried out are definitely known. Things are in an ascending scale and it is expected that the cost of operation will be higher this year than last, so that a mistake would be made in entering into lake freight contracts now, excepting at prices that would not be considered by the shippers.

#### TROUBLES OF THE TUG OWNERS.

If one important question, what to do with the men who remained in the employ of the Great Lakes Towing Co. during the long-protracted strike last summer, could be disposed of, there would be no trouble in bringing about an agreement as to wages, hours of labor, etc., between the tugmen and their employers for the coming season. Both sides have, of course, expected this difficulty, as it was not agreed, when a contract ended the strike last summer, that the non-union men who remained in the employ of the company should be discharged at the end of the season. It was simply understood that the contract was to stand only for the season of 1902 and that everything was to be taken up anew for 1903. Thus the main cause of disagreement, the disposition of the men not in the union, is as much in evidence now as it has ever been, the union refusing to take them into their ranks and refusing to work with them, while the tug company insists that they must be protected at all hazards. Of course efforts were made to secure for the men in dispute—there are some thirty-five or forty of them—reinstatement in the union in advance of negotiations for the coming season's contract between the union officials and officials of the tug company, but the efforts were of no avail.

The management of the towing company seems to fear a struggle similar to that of last year, no matter how earnestly they may be trying to avoid it, as is evidenced by their affiliation with the dredge interests. The dredging concerns employ a very large number of tugmen and it is understood that their association, formed in Chicago last week, is to act in conjunction with the towing company on labor matters. It is quite probable also that the reorganized Lake Carriers' Association, in taking up this year for the first time direct dealings with the labor unions, must give attention to the tug situation. In this direction probably lies the best hope of a settlement of the tug difficulty.

The new organization of dredge companies is to be known as the Great Lakes Tug & Dredge Owners' Protective Associa-

tion. W. A. Lydon of Chicago is president and C. J. Connell is secretary. The executive committee is composed of T. C. Lutz of Chicago, James A. Smith of Cleveland, O. S. Dixon of Milwaukee, E. P. Williams of Duluth and P. B. McNaughton of Buffalo.

#### NEW AIDS TO NAVIGATION.

The main object of the recent visit to Washington of President Wm. Livingstone, Counsel Harvey D. Goulder and Treasurer Geo. P. McKay of the Lake Carriers' Association was to secure in the sundry civil appropriation bill certain appropriations for lighthouses and other aids to navigation that are urgently needed on the lakes. They succeeded in securing in the bill, through senate amendments, all the items they were working for and have the promise of Senators Hanna and Burrows, as well as Congressman Burton, that the items will be looked after in conference and until the bill becomes law.

Of course this bill contains large appropriations for the improvement of harbors and connecting waterways of the lakes under the continuing contract system, but it was the new appropriations for lights, fog signals, etc., that needed attention more so than the fixed items of a river and harbor kind which are assured each year when once placed on the continuing contract list.

The new lighthouse appropriations for the lakes are: To Lake Carriers' Association for maintenance of private lights in lower Detroit river and for Southeast shoal lightship, Lake Erie, \$8,000; new tender for St. Mary's river, \$75,000; light and fog signal, Middle island, Lake Huron, \$25,000; Spectacle reef light structure, improvements, \$54,100; light and fog signal station, Milwaukee breakwater, \$75,000; Point Aux Barques, Michigan, light and fog signal station, \$32,000; light tower and fog signal, Racine reef, \$75,000; relief lightship for ninth and eleventh lighthouse districts, \$30,000; lightship for St. Martin's reef, Lake Huron, \$35,000; additional lights, Isle Aux Peches range, \$18,000.

The light tender for St. Mary's river will render valuable assistance. The lighthouse authorities now contract to have a boat patrol the channels of the river every day. This is necessary in order to protect the channels against the removal of stakes and the displacement of other aids to navigation. This work is done at a very considerable expense. The service is at present supplied by a rented vessel, engaged by the government from year to year, but in order to adequately perform the work required it is necessary that there should be a boat specially constructed and fitted up for lighthouse purposes. The new boat will have tanks to carry compressed gas to supply the numerous gas buoys in the channels; a hoisting plant for taking up and locating stakes and for taking care of other moveable aids to navigation. The boat will also probably be able to cut through ice.

The Middle island light is needed to make available the harbor of refuge behind Middle island, and to mark a turning point in the regular course of vessels bound up or down the shores.

The Spectacle reef appropriation is for reconstruction of the lighthouse at that point. This lighthouse is on an isolated reef in the northern part of Lake Huron. It was originally intended that the material of the tower should be granite, but by reason of a failure of a contractor lime stone was adopted. This material cannot resist the continued pounding and surging of the lake ice in the winter season. Certain cribs were used in the original construction which have been retained as part of the structure. These have been undermined and are in a serious condition of decay. There was danger that the investment already made by the government at this point would be rendered useless or very seriously impaired, hence the appropriation.

The Lake Carriers' representatives also sought an appropriation for a light and fog signal on Rock of Ages, Isle Royale, Lake Superior, but they were quite satisfied to waive their claims as to this item, in view of success in other respects. This light is needed, however, and an appropriation for it will probably be made next year. Rock of Ages is located near the western end of Isle Royale, north shore of Lake Superior, and during the season of southerly and westerly winds many vessels bound to and from Duluth, by taking a course along the north shore of the lake and in lee of Isle Royale, are enabled to run when the lake is too rough for the southerly course. A light and fog signal on the dangerous rocks off the westerly end of Isle Royale, of which the Rock of Ages is one, is required in order to safely navigate this course. Not less than \$125,000 will be needed to establish a light and fog signal at this point.

### LAKE SHIP YARD MATTERS.

It is hoped that the strike at the Chicago works of the American Ship Building Co. will not extend beyond that plant, but the fear of further labor troubles has caused the ship builders to actually refuse business running far into the future. No doubt the order, a few days ago, from the Messrs. Hawgood of Cleveland for one steamer would have been for two, one of them to come out in the spring of 1904, but for uncertainties in the labor situation. The Craig works at Toledo and the other so-called independent yards are also practically filled up for 1903 and are not disposed to go after further new business at present. The Columbia Iron Works of St. Clair is, however, said to be figuring on two steamers for Pacific coast service and these would be vessels that could not be completed within the present year.

One of the steamers for the Great Lakes & St. Lawrence Transportation Co. (Wolvin line) was launched at the Wyandotte yards of the Detroit Ship Building Co. last week. The new vessel was christened S. M. Parent. She is 255 ft. over all, 241 ft. keel, 41 ft. beam and 18 ft. deep. Her engines are triple-expansion, 15, 25 and 42 by 30 in. stroke, supplied with steam from two Scotch boilers, 11 ft. diameter by 11 ft. long.

The steamer G. W. French was successfully launched last week from the West Bay City ship yard of the American Ship Building Co. for C. W. Elphicke and others of Chicago. The new steamer is 376 ft. over all, 356 ft. keel, 50 ft. beam and 28 ft. deep. She has triple-expansion engines 20, 33½ and 55 by 40 in. stroke, supplied with steam from two Scotch boilers 12½ ft. in diameter and 11½ ft. long.

### AROUND THE GREAT LAKES.

There is no truth in the reported sale of the Mitchell steamers Lagonda and McWilliams.

The schooner Grace Holland, formerly operated by the Republic Iron Co. has been sold to Capt. Nagle.

Samuel Peck, a Lake Superior pioneer, died at Lake Maitland, Florida, last week. He was a resident of Marquette and was engaged in iron mining in the early days.

John Pauly has made an addition to his fleet of four steamers by the purchase of the steamer John Duncan from John Duncan of Green Bay. She will be used to tow the barge Aberdeen.

Thos. F. Madden, a well known vessel owner, died at his home in Bay City last week. His death was due to paralysis. He was forty-nine years old and had lived in Bay City for thirty years.

Edward Smith, a pioneer lumberman, died at Detroit Thursday, aged seventy-five years. Mr. Smith was a member of the old firm of Gratwick, Smith & Fryer, and was very well known in the lake trade. Two steamers were named for him.

Officers of Algonac harbor (No. 53) American Association of Masters and Pilots of steam vessels, elected recently, are: Captain, R. C. Jackson; first pilot, F. D. Galton; second pilot, B. D. Townsend; purser, James Brines; captain's clerk, F. R. Hemenger.

Capt. Frederick J. Simpson has been appointed master of the side-wheel steamer City of Mackinac of the Mackinac division of the Detroit & Cleveland Line. He has been in the employ of the company for fourteen years and has been on the City of Mackinac since 1892.

Two of Cleveland's leading vessel owners, J. C. Gilchrist and John Mitchell, are evidently not anticipating an early move towards freight contracts for the coming season. Mr. Gilchrist is in New Orleans and Capt. Mitchell is about to start for California on a business trip.

Joseph Randall, a well-known lake captain and pilot, died at his home in Algonac, a few days ago, having succumbed to a stroke of paralysis. He was seventy-eight years of age. Capt. Randall began sailing at the age of fifteen years, and continued until 1894, when he retired because of ill health.

Officers M. E. B. A. No. 51, Muskegon, Mich.: President, Den. McMillan, 105 4th st.; vice-president, M. Reck, 241 Muskegon av.; recording secretary, Dennis McMillan, Terrace st.; corresponding and financial secretary, H. A. Connell, 12 Ransom st.; treasurer, M. Reck, 241 Muskegon av., chaplain, H. O'Hara, 38 Ambrosia st.; conductor, P. Fredrick, 32 Blodgett st.; door-keeper, A. Lamoreaux, 19 Cherry st.

A great deal of useless talk has been heard of late about pilots on salt water fearing an invasion from men of the lakes, and about a law to prevent lake pilots from taking command of vessels on the seaboard until they have had actual experience on seaboard waters. Such is the law at present, and everybody interested in ships is agreed that on the lakes as well as on the seaboard the applicant for license, no matter what his qualifications may be, should have had actual experience on the waters for which he seeks license.

It is not probable that the management of the large fleet of steel vessels owned by the United States Transportation Co. of Cleveland will be transferred to new hands on account of the death of Capt. W. W. Brown. No definite action will be taken until after the funeral, which will occur upon the arrival of the remains from Europe, but it is expected that Capt. Brown's office force will be continued under the direction of Mr. W. H. Wilkinson and other officers of the company who have been in close

touch with the vessel affairs. Capt. Brown carried a very large line of life insurance.

Capt. Duncan Nicholson, last year in charge of the steel steamer Thomas Adams, has been appointed to command of the steamer Geo. L. Craig, building at the works of the Craig company, Toledo, for the Adams Transportation Co. Henry McCallum, master of the Langham last year, has been promoted to the Adams, and Capt. D. J. Duncanson who sailed the Ira H. Owen for several seasons, has been appointed master of the Langham. Capt. Duncanson sailed for Mr. Adams twelve years previous to service on the Owen, and only left his employ when the older boats were sold. J. A. Duncanson, brother of Capt. D. J. Duncanson, last year master of the steamer Jesse H. Farwell, has received his appointment as captain of the new steel steamer S. A. Parent of the Great Lakes & St. Lawrence Transportation Co.

### CHICAGO TUNNEL SUGGESTION.

Editor Marine Review:—I notice that the city of Chicago is going to ask the present legislature for permission to issue bonds for \$1,500,000 to perpetuate the La Salle and Washington street tunnel nuisances. These two tunnels cost to build more than \$1,000,000. The people declined to use them from the beginning, preferring to use the bridges. They were given away to the traction companies. The foot-paths in these tunnels are virtually abandoned, as the people cannot be tempted to make use of them. These two tunnels have already cost the shipping, transportation and other industries of Chicago at least \$10,000,000. When these tunnels were built, no one expected that the growth of vessels and shipping at Chicago would ever require more than 17 ft. of water. How much water will there be for floating vessels over the top of the tunnels when they are lowered at a cost to the taxpayers of \$1,500,000? New York, Boston and other modern ports are being dredged to secure 40 ft. of water and the tops of tunnels are being placed more than 50 ft. below low water. If the tops of the tunnels at Chicago are placed only 26 or 30 ft. below low water, how soon will it be necessary to lower them again? The new State street bridge costs only \$165,000 and gives twice the width for highway traffic of either tunnel. Would it not be better to build bascule bridges at La Salle and Washington streets and then remove the tops of these tunnels? This would give immediate and permanent relief to navigation. The grades of the bridges would be very slight, while the grade to the tunnels would be dangerously steep, even for street car traffic. The two bridges, accommodating twice the traffic of the two tunnels, could be built for less than \$400,000, as demonstrated by the new State street bridge.

Chicago, Feb. 25, 1903.

T. K.

### FAVORS DISCRIMINATING DUTIES.

Editor Marine Review:—After what has happened in Washington within the past week, Senator Hanna should certainly give up forever as impracticable that matter of subsidy for the general marine. The objects will always lie against it. First, subsidy or bounty to the carrying trade or any other business or calling is not provided for by our constitution. The states may pay bounties, and many of them do for different purposes. They never gave up to the general government their power to do so, and the general government never got from the states or people any power or right to use the proceeds of taxation for purely private purposes. The constitution provides a way for the protection of navigation. In large part the cause of its construction and adoption was to establish this protection. We must therefore take the way of the constitution or amend it. The second reason is that the people will not consent to tax themselves for ship subsidies. We have an illustration of this in the recent action of the house committee on marine and fisheries. Eleven Republicans and six Democrats constitute that committee—seventeen in all. Of these representatives of the people ten opposed and but seven favored the Frye bill. It could not be reported out. Thus, about one-third only of what was supposed to be, when appointed, a cock-sure machine for subsidy would act as imagined. If reported out and before the house about the same showing of unpopularity would eventuate. So, what is the use of kicking against the people with the constitution on their side? Besides the constitution and the people are right. Subsidy ground is not solid, is not statesmanlike. Its premises are unsound, false in fact, and in philosophy. The people can discern these things. Senator Hanna should not have aided in breaking the platform promise of 1896, "to reform our policy, and to return to the enforcement of the constitution by 'discriminating duties.'" In this he did not show his usual shrewdness.

SHIP'S FRIEND.

The installation of sixteen Niclausse boilers for the first of the Great Northern liners building at New London, Conn., has been completed at the works of the Stirling Co. at Akron, O., complete with drums, headers with tubes and casings. The set is now awaiting shipment and is reported as being the biggest boiler job for a merchant vessel ever turned out in the United States.

## APPOINTMENTS OF MASTERS AND ENGINEERS.

Mitchell & Co., Cleveland: Steamers—Moses Taylor, Capt. C. B. Galton, Engineer Wm. Fetting; F. H. Goodyear, Capt. H. A. Stewart, Engineer Wm. Fritz; W. H. Gratwick, Capt. R. C. Jackson, Engineer Chas. Love; H. S. Holden, Capt. F. D. Galton, Engineer John Scott; Walter Scranton, Capt. H. H. Townsend, Engineer Gus Guy; W. E. Reis, Capt. B. D. Tonwend, Engineer Louis Minnie; J. J. McWilliams, Capt. M. M. Stewart, Engineer Henry Graves; Lagonda, Capt. Fred Furtaw, Engineer I. A. Franscombe; H. C. Frick, Capt. W. W. Shorkey, Engineer F. B. Parker; Jas. Gayley, Capt. J. D. Baird, Engineer John Maedel; J. J. Albright, Capt. J. W. Auterson, Engineer Peter Lavelle; M. A. Hanna, Capt. Alex. Begg, Engineer J. D. Riley; R. L. Fryer, Capt. —, Engineer Frank Thomas; Major, Capt. —, Engineer —: Geo. T. Hope, Capt. —, Engineer Gilbert Newton. Schooner—Troy, Capt. Henry C. Diem.

Pere Marquette R. R. Co., Ludington, Mich.: Steamers—Pere Marquette, Capt. J. C. Ackerman, Engineer Robert Thielman; Pere Marquette 16, Capt. G. L. Thompson, Engineer Chas. Sylvester; Pere Marquette 17, Capt. Jos. Russell, Engineer A. W. Ackerman; Pere Marquette 18, Capt. Peter Kilty, Engineer Samuel Sylvester.

Rhodes, R. R., Cleveland: Steamers—Yale, Capt. James Jackson, Engineer Harry Stone; Minneapolis, Capt. Geo. Moore, Engineer D. J. McMillan; St. Paul, Capt. Peter Thompson, Engineer Henry Stone; Wm. Castle Rhodes, Capt. P. Dowdell, Engineer Guy Hemenger; Huron, Capt. Washington Moore, Engineer Clinton Folkerts.

Smith, Edward, Buffalo: Steamers—Thomas Cranage, Capt. John S. McNeil, Engineer Jos. Blanchett; City of Paris, Capt. E. D. Ballentine, Engineer James McDougall.

Tomlinson, G. A., Duluth: Steamers—Sultana, Capt. J. H. Driscoll, Engineer M. J. McAuliffe; Sonora, Capt. F. A. Fick, Engineer T. H. Welsh; Yosemite, Capt. G. W. McCullagh, Engineer —; Sinalva, Capt. W. D. Ames, Engineer F. A. Steadley; Sonoma, Capt. A. H. Reed, Engineer —; New steamer, Capt. D. P. Craine, Engineer A. B. Fortier.

Graham & Morton Transportation Co., Chicago: Steamers—City of Chicago, Capt. Wm. Russell, Engineer Wm. J. McClure; City of Milwaukee, Capt. John Stewart, Engineer C. L. Banon; Puritan, Capt. Wm. A. Boswell, Engineer James Stewart; Argo, Capt. Ed. Williams, Engineer Wm. T. Johnson; Soo City, Capt. A. J. Simons, Engineer —.

Carter, E. D., Erie, Pa.: Steamers—Panay, Capt. C. H. Wilson, Engineer Ogg; Luzon, Capt. E. A. White, Engineer Jno. Stevens.

Cleveland & Buffalo Trans. Co., Cleveland: Steamers—City of Erie, Capt. H. McAlpin, Engineer J. Y. Rendall; City of Buffalo, Capt. W. H. Smith, Engineer Chas. Lorimer.

Dunham, R. J., Chicago: Steamers—Ravenscraig, Capt. Geo. E. Atkinson, Engineer Geo. F. Wilson; City of London, Capt. Wm. Anderson, Engineer Wm. Nichols; Black Rock, Capt. John F. Hansen, Engineer Chris. Howard.

Eddy-Shaw Transit Co., Bay City, Mich.: Steamers—E. C. Pope, Capt. Wm. A. Williams, Engineer Wm. C. Anderson; Selwyn Eddy, Capt. Wm. Greening, Engineer John F. Quinn; Penobscot, Capt. Geo. C. Stevenson, Engineer Edward A. Hoffman; City of Bangor, Capt. A. J. Mahon, Engineer John M. Conroy.

Elphicke, C. W., Chicago: Steamers—Mary C. Elphicke, Capt. Jos. Mathews, Engineer S. C. Davis; Wm. L. Brown, Capt. John Massey, Engineer John Goulding; G. Watson French, Capt. L. B. Cummings, Engineer W. H. Walder.

Gilchrist, F. W., Alpena, Mich.: Steamers—Viking, Capt. H. Richardson, Engineer L. Richards; S. C. Hall, Capt. John Place, Engineer —. Schooners—Vinland, Capt. T. Stevens; Sam Flint, Capt. B. M. McCraffery; Nellie Mason, Capt. R. Mitchell.

Hutchinson & Co., Cleveland: Steamers—Germanic, Capt. James Murphy, Engineer Geo. Blauvelt; J. T. Hutchinson, Capt. J. H. Smith, Engineer Robt. Smith; City of Glasgow, Capt. W. P. Benham, Engineer P. Lyons; Queen of the West, Capt. S. F. Massey, Engineer —; Rube Richards, Capt. Robt. Kerr, Engineer Anton Rud. Schooners—Abyssinia, Capt. T. K. Woodard; E. C. Hutchinson, Capt. J. J. Martin; May Richards, Capt. A. McGougan.

McVittie, Alex, Detroit: Steamers—Senator, Capt. W. A. Irvine, Engineer W. J. Bolton; Colonel, Capt. A. Ames, Engineer A. Cobo.

## TRAFFIC OF PORTAGE LAKE SHIP-CANALS.

Alike to the great waterway at the Sault, the ship-canals of the Portage lake district (copper country of Lake Superior) are owned by United States government, and as they are under control of officials of the war department, accurate statistics of this commerce are obtainable each year. Capt. D. D. Gaillard, United States engineer at Duluth, recently completed reports of traffic through these canals. For the season of 1902 the registered tonnage of vessels passing through these canals is 2,550,493, the tons of freight 2,532,323, and the estimated value of freight

\$65,326,818.80. The different items of freight for 1902, with quantity and values, are shown in the following table:

A DETAILED STATEMENT OF FREIGHT PASSING THROUGH PORTAGE LAKE SHIP-CANALS DURING SEASON OF 1902, TOGETHER WITH ESTIMATED VALUE OF SAME.

Items	Designation.	Quantities	Price per unit.	Valuation.
Coal, (anthracite)	Net tons	70,011	\$ 6.25	\$ 437,568.75
Coal (bituminous)	Net tons	998,274	4.00	3,993,096.00
Flour	Barrels	448,290	4.00	1,793,160.00
Wheat	Bushels	839,380	.74	621,141.20
Grain (other than wheat)	Bushels	280,010	.50	140,005.00
Flax	Bushels	732,159	1.50	1,098,238.50
Manufactured iron	Net tons	21,304	65.00	1,384,760.00
Pig iron	Net tons	1,588	21.00	33,348.00
Iron ore	Net tons	193,596	2.25	435,456.00
Copper	Net tons	87,053	250.00	21,763,750.00
Building stone	Net tons	34,901	7.00	244,307.00
Limestone	Net tons	53,984	1.50	80,976.00
Oils	Barrels	27,275	7.00	190,925.00
Salt	Barrels	142,711	.60	85,426.60
Sand and Gravel	Cu. yds.	22,199	1.00	22,199.00
Lumber	M. ft. B.M.	344,627	15.25	5,255,561.75
Logs	M. ft. B.M.	31,140	12.50	389,250.00
General merchandise	Net tons	182,383	150.00	27,357,450.00
Total				\$65,326,818.80

Compared with previous years the number and tonnage of vessels, tons of freight and value of freight in 1902 were as follows:

Year	Number of vessels	Reg. tonnage of vessels	Total freight, net tons	Total value of freight
1902	4,631	2,550,493	2,532,323	\$ 65,326,818.80
1901	3,921	1,892,901	2,116,624	56,876,400.65
1900	4,020	1,749,291	1,867,772	57,380,129.05
1899	3,931	1,367,883	1,582,169	54,994,843.70
1898	3,909	1,447,216	1,367,835	39,254,415.50
1897	2,931	1,025,375	1,020,723	34,044,268.85
1896	3,569	1,076,548	1,041,933	29,953,787.02

The number of passengers on vessels passing through the canals in 1902 was 24,542 up-bound and 23,445 down-bound, a total of 47,987.

## MR. J. J. HILL ON HIS PACKAGE FREIGHTERS

Concerning the sale of the freight vessels of the Northern Steamship Co. to a syndicate representing the Erie, the New York Central, the Lackawanna, the Lehigh Valley and the Pennsylvania railroads, Mr. J. J. Hill of the Great Northern railway gave out the following interview in St. Paul a day or two ago:

"We still own the passenger steamers North West and North Land," said Mr. Hill, in speaking of the transfer. "Those steamers will continue to be operated by the Great Northern, but we had no more use for the freight boats. They were built for a purpose, and when the purpose was accomplished we were really to let them go. When we built those boats lake freights were high and elevator charges in Buffalo amounted to a cent and a half a bushel. When we built our elevators we put elevator charges down to half a cent a bushel and made a deep cut in freight rates between Duluth and Buffalo. There was only one man in the state at that time who understood and appreciated what the Great Northern had done for the farmers of the northwest in reducing those freight rates and elevator charges, and that man was Ignatius Donnelly. He was in Buffalo when our elevator was opened and investigated our charges and reported it in his paper. But we don't want any more lake business. Buffalo is a long way from here and it is hard to manage interests that are so widely scattered. Besides, if the other people wanted our boats and were willing to pay a fair price for them, let them have them. We are tired of fighting other people's battles anyhow; let them fight their own. That's why the boats were sold, and I don't care what the new owners do with them."

## LACKAWANNA STEEL CO.'S RESOURCES.

The offering of the Lackawanna Steel Co.'s new bonds has brought forth inquiries regarding the company and the following official information explains in answer to the proposition of the company:

"The company has ore properties in Minnesota, Michigan, Wisconsin and New York, on which there are said to be 56,000,000 tons of ore in sight. The company also owns and holds in fee 21,720 acres of bituminous coal lands in Pennsylvania. It also has blast furnaces at Colebrook, Pa., and coke ovens at Lebanon, Pa., and owns in addition the Cornwall & Lebanon railway and the Cornwall & Lebanon Iron Co. Reverting to the company's new plant at West Seneca, N. Y., it will be interesting to know also that a canal has been constructed from Lake Erie to the company's plant, thereby affording cheap and prompt transportation facilities for the handling of ore from the northwest and for the shipment of manufactured product. This new plant will be equipped with electrical power, transmitted from the power plant at Niagara Falls. It will readily be seen that these facts are of prime importance in considering the position of the company. The Lackawanna Steel Co. is the successor to the Lackawanna Iron & Steel Co."

**CANADIAN SHIPPING AND SHIP BUILDING.**

The hull of a new cruiser for the fisheries protection service on the Pacific coast for the Dominion government, was launched at Vancouver, B. C., Feb. 14.

Thomas Hodgins, K. C., has been appointed local judge in admiralty for the exchequer court for the district of Toronto, in place of Judge McDougall, deceased.

The Stanley Dollar Steamship Co., Ltd., has been organized at Victoria, B. C., with a capital of \$50,000. The company has purchased the steamer Silver Dollar, now registered at St. Thomas, in the Danish West Indies, and will bring her out to the coast.

The Port Stanley Navigation Co. has paid a dividend of 10 per cent. on its first year's operations and elected the following directors for 1903: Col. Lees, J. Tanbon, H. M. Douglas and Mr. Douglas of London; W. A. Day of Port Stanley; G. Crocker, A. M. Hutchinson, J. Walton, E. McCreadie and E. A. Smith of St. Thomas.

The stern-wheel steamer Hamlin, built for service on the Stikine river in the early days of the rush to the Klondike and owned by the White Pass & Yukon railway, has been sold to Victoria parties. It is intended to rebuild the steamer and enter into competition with the two existing services on the Skeena and Stikine rivers.

Wm. Peterson of Newcastle-on-Tyne, Eng., who successfully introduced the turret type of steamer on the great lakes in 1902, has arranged for an ocean line of steamers to sail from Montreal to Rotterdam. The first sailing will be April 15 from Rotterdam and the steamers will carry freight on through bills of lading to all parts of Canada.

J. J. Long is authority for the statement that the Collingwood Ship Building Co. has practically concluded contracts for two additional steel steamers, one 257 ft. in length and the other a few feet shorter. One of them is to be delivered in September. No information is yet available as to the owners or dimensions of the proposed new steamers.

The St. Joseph Transportation Co. will apply at the next session of the Dominion parliament for incorporation to construct a canal from St. Joseph on Lake Huron to Lake Erie. There are already in existence charters for two other canals to connect the waters of the two lakes, but neither of them have been able to attract the necessary capital to carry out their undertaking.

The annual meeting of the shareholders of the Richelieu & Ontario Navigation Co. was held in Montreal Feb. 19. The annual report showed gross receipts, \$1,036,666, operating expenses \$840,449, fixed charges \$21,632, net profits \$174,584, against gross receipts \$1,109,458, operating expenses \$920,569, fixed charges \$22,792 and net profits \$166,097. A dividend of 6 per cent. was declared.

The legislature of Jamaica has offered a subsidy of \$12,500 a year for a new fast direct steamship service between Kingston and other Jamaican ports and Canada. Negotiations are in progress with the Canadian government with a view of a Dominion subsidy being obtained. A direct freight service between St. John, N. B., and Kingston was inaugurated in 1902, and has been carried on with success.

There will be launched at Shelburne, N. S., next week, the new Westport for the Insular Steamship Co. Her dimensions are: Length, 103 ft.; beam, 21.3 ft.; depth of hold, 8.8 ft. She will have cabin accommodation for fifty passengers and general accommodation for 100 more, with large cargo carrying capacity and will have a speed of 10 miles an hour. The Westport is for general trade along the Nova Scotian coast.

Capt. Batten and Capt. Oulette, who piloted the Richelieu & Ontario Navigation Co.'s new steamer Montreal through the Lachine rapids at the end of the season of 1902, have been presented with gold watches by the company. The Montreal is nearly 100 ft. longer and drew 1 ft. more water than the largest steamer that had previously run the rapids, and in addition there was 1 ft. less depth of water in the river at the time.

The Niagara Navigation Co. has appointed John Foy, late general manager, to be president, and B. W. Folger, at one time general manager of the St. Lawrence River Steamboat Co., general manager. It is now looked upon as certain that the company will not be taken over by the Richelieu & Ontario Navigation Co., the appointment of Mr. Folger to general manager being regarded as an additional step in the direction of a consolidation of steamship lines on Lake Ontario, the St. Lawrence river and some of the smaller stretches of inland navigation north of Lake Ontario, under the control of the New York Central railroad.

Within the last two years the masters and mates in seven of the principle centers of navigation in Ontario organized and enrolled so many members that it has been found desirable to organize a Grand Association of the Canadian Order of Masters and Mates. The first meeting was held at Collingwood when the following were elected officers: Grand president, Jas. Wilson, Collingwood; grand vice-president, W. C. Jordan, Collingwood; grand secretary, W. Ireland, Parry Sound; grand treasurer, Capt. McKay, Owen Sound; grand conductor, M. Leroux, Midland; grand tyler, W. Bell, Penetanguishene; grand auditors, G. H. Playter and Capt. McIntyre, Parry Sound. Branches of the association exist in Collingwood, Midland, Owen Sound,

Parry Sound, Penetanguishene, Sarnia and Toronto. A special organization committee was appointed to visit other centers and enlist the active co-operation of the masters and mates residing there.

The Canadian Pacific Railway Co. announced a year ago that it intended to engage in the transatlantic trade, and a definite announcement of its program will be made at or just prior to the regular meeting of stockholders to be held shortly. During the year the company's plans have been perfected and negotiations carried on in regard to steamers, etc. For the present, at any rate, the company will use Montreal as a summer port and St. John during the winter months. The object of the company in establishing its own line is to be enabled to carry the freight brought to the seaboard by its lines across the ocean without having to rely on independent lines of steamships, or on space offered on the steamers controlled by other railways. With the Dominion and Leyland lines, starting from Montreal and Quebec, under control of the International Mercantile Marine Co., the company was forced to take steps to secure its own line, as the available cargo capacity open for charter was thereby reduced. The company has practically concluded negotiations with the Elder, Dempster Co. for the purchase of a number of their largest freight carriers, but it is the intention of the company to build a number of steamers of the largest size to add to the line.

**TO IMPROVE MIDDLE CHANNEL, ST. CLAIR RIVER.**

President William Livingstone of the Lake Carriers' Association was especially instructed at the recent meeting of stockholders in Detroit to induce congress to improve the middle channel of the St. Clair river. It is desired, if possible, to provide for the preliminary surveys during the coming summer. The following communication, concerning the improvement, was presented to the association:

"The association will remember that the year 1902 was no exception to the general rule of past seasons in respect to loss of life and property in the south channel, from the point above its source at the head of Russell's island to the ship canal or cut at the St. Clair flats. It is well known to all familiar with lake navigation that the southeast bend in the south channel, because of its great depth and sharp turn, has been the cause of a very large destruction of property and loss of life. But nature has provided, on the American side of the boundary, a safe, wholly practicable and cheap outlet, in the middle channel, when improved by dredging, so that all steamers and vessels downward bound may take that passage and thus eliminate all risk of collision and forever preclude an extension of this startling record of loss of life and of property heretofore made in navigating the south channel. It is now possible, if not quite probable, that two of the largest steamers on the lakes, if meeting and attempting to pass in the swift current at the southeast bend, (whose center is the boundary line), may collide and sink in such a manner as to entirely obstruct the channel; and, moreover, that the extreme depth of the water there might prolong the raising of the consequent blockade for a long time, and possibly necessitate the destruction of one or the other of the ships at a great pecuniary loss, to say nothing of the possible loss of life. Moreover, the currents of the north and middle channel are very much stronger than that of the south channel for the greater part of its length, and as ships downward bound, taking the middle channel, improved as proposed, could run at full speed, except in the dredged channel; they could make much better time than in the south channel, and have the risk of collision entirely eliminated; while to this may be added that by ships upward bound taking the south channel—which by regulations they might be compelled to take—a similar risk in that channel would be avoided."

**AN IMMENSE LUMBER DEAL.**

Duluth Minn., Feb. 17.—Mr. W. H. Gilbert, a leading lumberman of this district and owner of a sawmill and much timber here, has just closed a remarkable and immense timber deal. He has bought between 3,000,000,000 and 4,000,000,000 ft. of standing pine on the Bahama islands, chiefly on the Grand Abaco, Great Bahama and Andros islands, and has secured from the British government permits for cutting and manufacturing as soon and as fast as desired. He is now on his way to the islands accompanied by his chief logger and by manufacturing experts to make a survey that shall determine when, where and how manufacturing shall be begun. The timber is yellow pine, similar to that of the south Atlantic states. There is in connection with the pine a considerable amount of mahogany, which Mr. Gilbert has also bought and which is probably worth an immense sum.

This timber will be exported to Liverpool, and will not come to the United States until the duty is taken off lumber. It is chiefly adapted for ties, car sills, and other special bills of long timber requiring exceptional strength, such as piling. The trees are small but very straight and tall. The price at which this vast amount of timber was secured is ridiculously small. Mr. Gilbert was on a search for some of the neglected opportunities of the lumber world when he ran across it. Mr. Gilbert is cutting 60,000,000 ft. here and at Ashland this year, all of which goes east by lake.

## EARLY DAYS ON LAKE SUPERIOR RECALLED.

[From a Special Correspondent.]

Lansing, Mich., Feb. 12, 1903.—There occurred an unusual spectacle at the state house last evening when two pioneers of the Lake Superior section of the state addressed the members of the legislature informally in the representative hall, which by a resolution of the house had been tendered to them for such purpose. Gov. Bliss presided and nearly all the members of both houses were present. The two pioneers were both septuagenarians but hale and hearty, and were most cordially received, as it was known that they only remained of that class who were prominent, and could speak of a full half century's experience and observation of the industrial progress made in that section of the state for over fifty years past.

One was the Hon. Peter White, president of the first national bank of Marquette and of the upper lake region, and a former state senator, and the other was Charles T. Harvey, who was for many years a resident in the same district with Mr. White, first as manager and chief engineer of the constructing company building the original Sault or state canal, also as builder of the first public road across the peninsula to Lake Superior, and later as promoter and chief engineer of the first railway to those waters, but at present president and chief engineer of a new railway line in Canada—with a residence at the dominion capital.

Mr. Harvey spoke first, and for over an hour kept the audience in wrapt attention while he stated some of his experiences in securing national aid for railways in Michigan in the shape of land grants in 1856 amounting to several millions of acres. This result he declared was owing first to his being left behind at Ontonagan by the last steamer which passed east along the south coast in the fall of 1855, necessitating his snow-shoeing across the district to the head of Keweenaw bay, (his companion being Mr. E. C. Hungerford, now residing at Chester, Conn., and one of the leading citizens and president of the bank in that town), and then for want of even a trail southward embarking in a small row boat and following the coast for 150 miles to Marquette, in the month of December with several narrow escapes from death enroute. In continuing south he traversed the entire length of Green bay, 120 miles, on the ice, and then by sleigh to Fond Du Lac at the south end of Lake Winnebago in Wisconsin, which was as far north as railways then extended. The journey consumed about a month. These delays and exposures led him to go to Washington to promote aid for a railway to Lake Superior. He attributed his success mainly to making a studied effort to gain the favor of the southern members who controlled congress at that time. This he did drafting a map and having it lithographed on a large scale showing a continuous line from Marquette on Lake Superior to Mobile on the bay of that name, being an estuary of the Gulf of Mexico. He gave an amusing account of the want of faith in the idea by members from the lake states, but which was more than counterbalanced, however, by the enthusiastic support of the southern members after the map had been displayed to them. The outcome was a grant of land to each of the states through which the route ran, to aid in its construction, and every mile had since been built and is now in use.

A copy of the map which effected this result he said was still in existence and he contemplated presenting it to the state with a detailed account of his trip, printed, to accompany it for preservation in the state library. The snowshoes he then used he presented soon after to a friend who caused them to be preserved in a public institution in New England, namely the Fairbanks museum at St. Johnsbury, Vermont, where he saw them not long since.

At the next session of the legislature, which was in 1857, he was in attendance as an interested party concerning the disposition of the land grants which he had been the chief factor in obtaining. He then had an office at Marquette and as his friend Mr. White was elected as the local member of that legislature, they started from that point together, and he would leave it to him to speak of their joint experience on that trip. He recalled, however, the remarkable coincidence that the hall of representatives in the old state house was by resolution tendered to him to address the members of the legislature of 1857 on the resources and commercial prospects of the Lake Superior region. The members of both houses attended and the then governor, Bingham, presided and introduced him to the audience. He then read from a book published that year, the existence of which was not known to him until sent to him by a friend, in which lengthy extracts from his address as reported in the Lansing and Detroit papers at the time, were quoted, particularly the sentence in which he predicted that within twenty-five years the commerce of Lake Superior passing through the St. Mary's river would equal that then finding its way through the St. Clair river. His prediction was at that time made the occasion of considerable good natured banter by persons in the audience, especially by the late Capt. Eber B. Ward, owning the largest amount of vessel tonnage on the lakes, who happened to be present. At the end of the quarter century mark his prediction was verified with a wide margin in excess. Now forty-six years later on a similar invitation he was again addressing the legislature with the governor now, as then, presiding, and the figures of the traffic passing through the St. Mary's river now reached the enormous total of about 36,000,-

000 tons. Had he in his first address made an estimate of such results his sanity would have been doubted!

On the conclusion of Mr. Harvey's address Mr. White proceeded to give an account of their joint trip in 1857. They were nineteen days on the way from Marquette to Lansing, and when coasting along Green bay on a December night were in great peril from the rapidly forming ice abrading the sides of their thinly-sheathed boat. Both of the speakers urged legislative sanction and aid on a liberal scale of the semi-centennial celebration of the commencement of the Sault canal on June 4 next.

They also spoke enthusiastically of the plan of securing the site of Old Fort Michilimackinac on the south side of the Straits of Mackinaw as a public reserve and erecting thereon a slightly monumental which will be the only monument on this continent of the Chief Pontiac war, in which native savagery made its last notable stand against civilization in the great lakes region.

To those who remember the state canal days when most of the pioneers of the Lake Superior country were living factors in its progress, such as Amos R. Harlow, John Burt and Dr. M. L. Hewett of Marquette, Ransom Sheldon and C. C. Douglass of Portage Lake, D. S. Cash and A. R. Burtenshaw of Ontonagon, and John Hays of Cleveland (who sent the first consignment of lake copper to market), the appearance on the platform of the last surviving representatives of that class was an event of special interest not likely to be repeated. Mr. White, it was stated, went to Marquette in 1847 and Mr. Harvey first visited that location in 1852.

## IN FAVOR OF THE 1,000-TON BARGE CANAL.

At a meeting of the New York chamber of commerce last week resolutions were adopted approving the proposal before the legislature to improve the Erie canal and the Oswego and Champlain canals in the manner proposed by what is known as the 1,000-ton barge canal. In moving the adoption of the resolution Mr. A. B. Hepburn of the committee on internal trade made a speech which elicited great applause. He said:

"It is impossible not to feel annoyed at the trend of events with reference to the canals of our state. Several years ago we voted to expend \$9,000,000 in order to put them in efficient condition. The profligate expenditure of a portion of that sum and the total inadequacy of the sum appropriated to even approximately modernize canal transportation has had a baleful influence upon the canals ever since. In 1900 the legislature authorized the state engineer to make elaborate surveys and estimates of cost as to different routes. A report of more than 1,000 pages followed. This was supplemented by the report of the Greene commission and the United States board of engineers on deep waterways. We have been surfeited if not confused by the data furnished. Last year Gov. Odell recommended that the locks of the canal be enlarged to a 1,000-ton barge capacity and that the canal be deepened to 9 ft. This chamber endorsed the recommendations of the governor. Certain interests of this city went to Albany and, adopting the motto of a 1,000-ton barge canal or nothing, united with the rural opponents of the canal to defeat the act submitting the proposition to the people for approval. By their action they have brought the commercial interests of this state perilously near to the alternative—nothing."

"However, the proposition now pending is a 1,000-ton barge canal to cost something in excess of \$62,000,000, and certainly presents a question upon which this chamber must have views, and ought to express them. The canals were completed to a depth of seven feet in 1862, and since then nothing has been done to increase the navigable capacity of the canals. What have the railroads done in the past forty years? They have increased the maximum railroad train capacity from 300 tons, or 10,000 bushels of wheat to 2,700 tons or 90,000 bushels of wheat. The capacity of a canal boat plying the Erie canal thirty years ago was 220 tons, equal to 74 per cent. of a train load; today it is 240 tons, which equals .088 per cent. of the maximum train load of today. Since 1862 the New York Central & Hudson River railroad has increased the number of miles of road which it controls, and operates 9,650 miles, capitalized at nearly three-quarters of a billion dollars, gridironing the east and central west in its laudable ambition to reach and control business. The Baltimore & Ohio has spent for equipment, betterment and improvements in the past two years, \$15,000,000, and has contracted for or determined upon the expenditure of as much more. The Lehigh & Wilkesbarre has expended \$8,000,000 in the past two years for the same purpose, the Delaware, Lackawanna & Western \$10,000,000, the Erie \$7,500,000 and now has authorized a bond issue of \$50,000,000 for improvements and equipments. The New York Central has expended \$7,500,000 and is about to expend upon its terminals \$40,000,000. The greatest of all our railroads, the Pennsylvania, has expended \$45,000,000 recently to improve its efficiency, has a \$50,000,000 tunnel on hand, and bridge construction and other improvements the cost of which I won't venture to estimate. Curves must be straightened and grades reduced, the capacity and facility of equipment increased, and no one doubts, and no one questions, that it is wise economy and good business judgment. If it is wise economy and good judgment as applied to railroads, is it not incumbent upon the great state of New

York to apply those principles in the management of her system of canals?

"No prudent man would build canal boats of the present capacity with the impending prospect of having the capacity of the canals increased. Hence the present canal equipment is especially run down and decrepit. The necessity for action and early action is important.

"I was a member of the legislature representing one of the northern counties when the tolls were removed from the canals I opposed making them free, not because I was opposed to the canals, but because I feared, as I then stated, that the time would come when the canals would be ground out of existence, between the upper and nether millstone of false economy on the part of some of the rural counties and inevitable rivalry of other carriers of freight. That pretty nearly describes the condition that confronts us today. The removal of tolls inured principally to the benefit of the handlers of freight at the terminals. An amendment of the constitution so as to leave the question of tolls in the discretion of the legislature would, I feel sure, inure to the benefit of the canals and the commerce of the state.

"In their present unsatisfactory condition the canal transportation for the year 1901 amounted to 3,420,613 tons, 1,113,617 tons of which had for its terminus the city of New York, or about 25 per cent. of the total. The canals should be maintained primarily as a regulator of the cost of transportation as fixed by the railroads, and for that purpose their annual worth to the commercial and business interests of the state would equal their annual cost.

"Secondly, they are needed to supplement as well as rival the railroad traffic of the country. When the anthracite miners' strike was declared off and coal was being mined in abundance the community still suffered because of the inability of the railroads to transport and deliver the same. There has been a terminal congestion of freight in all the larger cities and business centers of the country. Even the Pennsylvania railroad had to lay off its twenty-hour passenger train to Chicago in order that the trackage might be used in distributing freight of the company and relieving the congestion.

"Under these circumstances the great state of New York ought to conserve the business interests of its citizens and defend its own primacy by applying the principles and rules of management to the conduct of its canals which business experience and business foresight have proven to be necessary in order to preserve and promote the efficiency of private transportation enterprises."

#### THE CANADIAN PACIFIC PURCHASE.

Sir Thomas Shaughnessy, president of the Canadian Pacific railway, has confirmed the report of the purchase from the Elder-Dempster Steamship Co. of fourteen vessels now engaged in Atlantic trade. Concerning the purchase he said:

"We have now almost completed the negotiations which have been under way for some time that we might secure an Atlantic service of our own for both passenger and freight traffic, and all that remains to be done is to adjust a few details and then we commence to operate our own line. This purchase is merely the nucleus of the fleet we expect to possess. Among the other details which have yet to be arranged is that of remuneration by the government for the carrying of the mails, which comes within the scope of the operations of the passenger steamships. Five vessels of the fleet will be devoted to passengers and cold storage, the passenger boats being the Lake Manitoba, the Lake Champlain, the Lake Erie, the Montfort and the Monteagle. The Montfort, the Monteagle and the Lake Erie are equipped for cold storage, as are also the freight steamships Monterey and Montcalm, which are constructed so they can be adapted for the passenger service should such become necessary. The average speed of the vessels constituting the fleet is understood to be about 15 knots, and the tonnage ranges from about 5,500 to nearly 9,000."

The Canadian Pacific will probably continue to run the steamships from the same ports as at present—Montreal in summer and St. John and Halifax and Portland in winter—but this is subject, Sir Thomas said, to further consideration.

#### ESTIMATES FOR DEPARTMENT OF COMMERCE.

Estimates aggregating \$8,075,000 for the support of the department of commerce and labor for the remainder of the present fiscal year and the whole of the next have been submitted to congress. The estimates include also the erection of a new building for the department. Upon this score Secretary Cortelyou recommends that the building should not be inferior in convenience and beauty to the structures which commercial and financial institutions in the great centers of American trade are erecting for the transaction of their daily business. It should be designed on a scale large enough to provide for the reasonable growth for some years to come of the various branches of the public service comprising the department at the outset, and to supply quarters for such other branches of the service as by creation or transfer may hereafter be brought under its jurisdiction. It should have at least one hall suitable for conferences or congresses, international or national, which by invitation of

the government of the United States have met in this country in the past and may meet hereafter. The department contemplates having 1,300 persons in its employ by July 1.

#### MISCELLANEOUS MATTERS.

A meeting of stockholders of the ship yard will be held Mar. 12 to elect directors.

The lake-built Minnetonka is under charter to take a general cargo from New York to San Francisco in March.

Naval Constructor John G. Tawressey, who is stationed at San Francisco as government inspector of the war vessels which are being built by the Union Iron Works, has resigned.

It is reported that the Baltimore Ship Building & Dry Dock Co. and the William Skinner Ship Building & Dry Dock Co., Baltimore, Md., are negotiating to combine their interests.

The big steel ship Atlas, belonging to the Standard Oil Co., and the handiwork of Arthur Sewall & Co., Bath, Me., has just completed a fast trip from Hong Kong to the Virginia coast. The run was made in ninety days. This record has been beaten but once.

It is more than probable that the bill creating a commission to raise the laws relating to the construction and inspection of marine boilers, which was printed in the last issue of the Review, will be passed. The bill has been favorably reported from committees to both house and senate.

Bids for the completion of the dry dock at the League Island navy yard were opened a few days ago by the bureau of yards and docks, navy department, Washington, D. C. The bid of the C. M. Scofield Co., Pittsburg, to complete the dock in two years at a cost of \$1,148,500 was the lowest.

Lightship No. 71 broke away from Hatteras in last week's storm, was returned, broke away again and was found in Hampton Roads, having come in under her own steam. The new lightship No. 71, built at Petersburg, is hauled out at Norfolk for finishing touches. She will go to the coast of Maine.

Bids will be opened in the department of yards and docks, Washington, D. C., on March 14 for constructing a steel floating dry dock for the naval station, Cavite, Philippines. The dock is to be not less than 500 ft. long, 100 ft. wide and to have a lifting power of 16,000 gross tons. The appropriation available for the dock is \$1,225,000.

The knockabout Apache, owned by L. C. Wade of the Boston Yacht Club, has been sold to Mr. J. Willis Martin of Philadelphia through the agency of Frank N. Tandy. The Apache is a cruising knockabout 21 ft. on the water line, 32 ft. 3 in. over all, 7 ft. 3 in. beam and 5 ft. 5 in. draught. She is an exceptionally fine cruiser and will be used by Mr. Martin at Winter Harbor, Me.

Mr. William R. Trigg, president of the William R. Trigg Co., Richmond, Va., died last week at his home after an illness which lasted practically for a year. He was only fifty-four years old. He was instrumental in establishing the Richmond Locomotive Works, and founded a few years ago the Trigg ship yard. More than any other one man he developed the manufacturing resources of Richmond.

Senator Lewis has introduced in the senate at Albany a bill to provide for the appointment of a commission of three to inquire whether the United States will undertake the construction of a deep waterway from Lake Erie to the Hudson river. The advocates of canal improvement protest that this measure is submitted simply to confuse the issue. They declare that there is no practical hope of a ship canal through New York state.

It is reported from Pittsburg that the Jones & Laughlin Steel Co. has completed arrangements for the erection of a steel rail mill to cost \$2,000,000, and that the company will also increase its capacity for finished products by building structural mills costing \$1,000,000. The new rail mill will be a combination mill, to be operated on both rails or billets and bars, or either. Devoted exclusively to rails, its daily output will be 2,000 tons.

The naval appropriation bill, as it has passed the house of representatives, provides for three new battleships, one armored cruiser, two steel training ships and one wooden brig for training purposes. In addition the secretary of the navy was authorized to purchase submarine torpedo boats, costing not more than \$500,000, which in his discretion meet the requirements of modern submarine warfare. He is directed to conduct experiments and determine the best type of boat. The bill contains a stringent provision to prohibit hazing at the naval academy, submitting anyone found guilty of the practice to immediate expulsion.

It would seem from cable dispatches that the second trial of the British cruisers Hyacinth and Minerva, fitted with water-tube and cylindrical boilers respectively, did not result favorably for the water-tube boilers, though judgment must be reserved until the full data is obtained. According to the cable the warships left Plymouth with an equal quantity of coal for Gibraltar and the Minerva steamed twelve hours after the Hyacinth's bunkers were empty. The vessels recoaled at Gibraltar and started on the race homeward during the morning of Feb. 15, with the result that the Minerva reached Portsmouth on the morning of the 18th, having averaged 18 knots. The Hyacinth's boilers broke down in the Bay of Biscay.

## CANADA TO ESTABLISH A COLONIAL NAVY.

The St. John's, N. F., correspondent of the New York Times is authority for the statement that Canada is about to create a colonial navy, and as the first step towards this end will establish a naval militia on the Atlantic seaboard where there are thousands of men engaged in the off-shore and Grand Banks fisheries. To provide the requisite machinery for the founding of this organization the government has dispatched the British naval commander in charge of her fisheries protection squadron to this port to examine into the workings of the Newfoundland naval reserve with a view to modeling the proposed Canadian battalion upon the highly successful little brigade in the island colony.

The Newfoundland reserve is an imperial body, a branch of that trained around the coast line of the British isles. It is recruited among the young fishermen, and regulations as to enlistment, training, payment, and service are identical with those in vogue in England. There is a permanent drillship, the dis-classed cruiser Calypso, stationed in St. John's, the officers of which "lick into shape" the raw material, and this is then drafted aboard regular warships for a term of sea service. A detachment of eighty men from Newfoundland is now serving aboard the cruiser Charybdis, Com. Montgomerie, flagship of the allied fleet recently blockading the Venezuelan coast, and 150 are now being trained at St. John's to join her and the battleship Ariadne at the end of October next, when they finish their summer patrol of the "French shore" of this island.

With the similarity in conditions along the Atlantic fore-shore, both in Canada and Newfoundland, the former country has naturally looked to the latter's naval force as the model for her own. The legislation to create it is to be enacted at the coming session of the Ottawa parliament, and the officer now at St. John's will formulate the details of the scheme. It will not, however, be an imperial force, like Newfoundland's, but a purely domestic organization, like Canada's militia, though it may be used for imperial defense in an emergency, as Canada enlisted her several contingents for service in South Africa during the recent Boer war.

Canada has already the nucleus of a navy in her flotilla of fishery cruisers, sixteen in all, of which twelve are stationed on the Atlantic, two on the lakes, and two on the Pacific. They are stout and serviceable steamers, armed with machine guns and the latest additions strengthened to carry quick-firers, if desired. The effective personnel is ninety-two officers and 680 men, and these are all grounded in the rudiments of drill. The twelve on the Atlantic patrol the coast line from Fundy bay to Belle Isle strait, a stretch of 5,600 miles, and enforce the fishery laws, prevent smuggling, and supply the lighthouses. Their period of service is usually from May until November, and they are, with one or two exceptions, laid up for the winter and their crews discharged. This causes many breaks in the personnel from season to season, and the idea of the naval enlistment would be to train them for this service during the winter months so that a substantial backbone will be provided permanently around which the casual force enlisted from year to year could be grouped.

There are 30,000 deep-sea fishermen in the maritime provinces, besides some 20,000 other men employed in the coast fisheries, and this makes a total considerably larger than that of the operatives in the New England fisheries. From this total it is estimated that 10,000 young men can be obtained to enlist in the naval reserve, the period of training being arranged for the winter as in Newfoundland, because much of the seaboard being then blockaded by ice fishing on a large scale is impossible, and the greater portion of the trawling fleet is laid up in the coast harbors until the spring, while the men seek other employments in the mines and the lumber camps, until the season re-opens. It has been found possible in Newfoundland to enlist hundreds of young men of the finest class of mariners for service and drill during that period, whereas during the fishing months it would be impossible to procure them without seriously dislocating the ordinary industrial conditions of the island and interfering with the successful prosecution of the cod fisheries.

The Newfoundlanders have proved to be admirable recruits, their seamanship being exceptional. Bred to their maritime pursuit from early youth, they are proficient in all sailorly arts and can handle boats and small craft with unequalled skill. They are stout oarsmen and masters of compass, logline and lead, and they have little to learn about the internal economy of sailing craft. The more intricate naval material they acquire readily and they pass about 95 per cent. of their number into the grade of "qualified seamen" after a six months' cruise. There is a total seafaring population of nearly 80,000 in the island to recruit from and the admiralty aims to put through 600 men every year which will be all that the squadron in North American waters can accommodate.

This will give a trained force of 6,000 men in ten years, and if Canada's scheme prospers to a similar extent the result will be the formation of an auxiliary to the imperial forces which will be very acceptable in the day of trial. Last year the British navy had a total effective force of 155,000, of whom 120,000 were at sea, 28,000 in the reserve and 7,000 composing the coast guard. Within five years it is calculated that this total will be swollen

to 200,000, which will be about all the naval recruiting that the British isles will stand, owing to the simultaneous need for the enlargement of the army. For this reason an overseas reserve of 5,000 or 10,000 men will be very satisfactory, more especially when composed of such approved material as the Newfoundland branch has shown itself. The prospect, indeed, is that the port of St. John's will be fortified within a few years, and converted into a naval base with a special application to the more effective safeguarding of the Atlantic grain route, which passes across the grand banks almost within sight of St. John's and is dominated from this port. At present the only naval stronghold of Great Britain hereabout is Halifax, Nova Scotia, but grain ships, whether from American ports or plying via the St. Lawrence, do not approach that place and are utterly devoid of protection or shelter when east of Cape Race, against an enemy in mid-ocean.

For this reason St. John's is being considered as a suitable site for another stronghold, because it already has a squadron of British cruisers stationed there in summer, owing to the French shore dispute, and the reservists could be more easily mustered there than elsewhere, while the natural features of the port are such that it can be made impregnable at a very small cost. The harbor is almost landlocked, inclosed within high hills crowned with batteries which command the whole sea face, and which could, with modern artillery, be rendered so effective that the port would become the refuge for all the convoys crossing the ocean. The advantageous geographical position of Newfoundland has been made more manifest latterly through the discussion about fast lines and ocean routes, and the further fact that all the ocean cables cross the grand banks and could be cut without hindrance as things now are, accentuates the need of stationing warships here and adopting adequate defenses so that an aggressive or defensive course could be taken as circumstances warranted.

The cruisers could be used to scout beyond the grand banks or sweep these waters of an enemy's shipping. The port could be utilized to fall back upon, to shelter merchantmen, or to refit war craft and recrue them from the reserve. The men of this force would be gathered there if war impended, and would be employed to partly man the batteries, and with St. John's and Halifax so provided the defense of the western ocean would be virtually assured.

The complete success of the naval reserve plan, so far as Newfoundland is concerned, is admitted by the naval experts, but they are doubtful of the Canadian experiment for a variety of reasons. Canada declined last year to share in the contributions to the imperial navy which the other colonies made, and has adopted this policy as an alternative. But the objection to this is that it is not an imperial arm and is not available for imperial purposes except when Canada pleases, whereas the imperial navy has to be always employed to defend Canada's territory or commerce if these are menaced.

That navy is obliged, by the peculiar relations between the mother country and the colonies, to defend all of them as well as her own shores. For many years past Australia has contributed to the maintenance of a special squadron in her waters for the defense thereof, but the other colonies made no such endeavor to assist Britain. Last year, during the coronation functions, Mr. Chamberlain submitted to the colonial premiers the matter of imperial naval defense, and they all undertook to provide annual subventions, Canada alone excepted. Her refusal was due to an unwillingness to become a party to all Britain's European entanglements, and she is adopting the local naval organization instead. But this is of merely negative value to the empire, because it relieves the British taxpayer of no burdens and obliges him to provide his full naval force, as at present, seeing that Canada's help may not be forthcoming when he expects it. The battalion will undoubtedly be a good one, as Canada's military force was in South Africa, but it is not subject to levy at all times.

Moreover it has no ships of its own except the fishery cruisers which are not armored and cannot be regarded as effective, judged by the standards of modern war craft. Likewise, it has no experienced men whatever, no sea drill under the actual conditions of war ship life, no familiarity with the contingencies of scouting and fighting work, and would be worthless if set to act for itself. It is contended that it could be employed to defend the St. Lawrence route, but the fallacy of this is obvious, as it could do nothing without the aid of the British navy, and the contention of the British authorities is that it should be organized as an imperial force and part of the cost of its maintenance borne by Canada as a contribution toward the war fund, the admiralty supplying ships in which to train the men, and the whole scheme being assimilated with that for imperial defense in which the other colonies are all enlisted. The isolation of Canada is the weak spot in the plan, and until she has joined the other colonies the permanence of the project cannot be assured.

The Canadian government seems to think that the alternative they are wedded to will satisfy all the obligations for which they are liable. The fact is overlooked that a formidable combination of European powers may work such disaster to England's navy that it would be unable to keep the sea, and in that case Canada's force would count for naught, whereas if included in

the regular navy at the outset of a fight it might be the means of preventing a disaster.

The British authorities assign another important reason for discouraging a special Canadian force, and it is that the men trained by Canada as proposed would mostly all drift across the border and join the American navy, just as they form the mainstay of the American fishing fleet today. The contention is that the higher pay and lighter work would be a great inducement for them to migrate to the United States and join the warships there, in the absence of any imperial obligation such as binds the Newfoundlanders to the imperial service. The only remedy for this would be to establish the battalion as an imperial auxiliary, under the same conditions as Newfoundland's, and failing in this, a disappointment, if not a failure, is predicted. The lack of a central authority is recognized by all to be a decided defect in the scheme, and it may ultimately transpire that Canada's force may be converted into an imperial corps and utilized accordingly. Meanwhile, however, the fact remains that it is to be organized as a colonial battalion, and the outcome of the experiment should not be without interest for the United States as well as Canada and Great Britain.

#### FINANCIAL STATEMENT NORTHERN NAVIGATION CO

The annual meeting of the Northern Navigation Co. of Ontario was held at Collinwood recently. The report for the year ended Dec. 31, 1902, shows that the paid-up capital stock was increased during the year from \$560,000 to \$840,000 to purchase the minority stock of the Northwest Transportation Co. and to pay for the new steamer Huronic, which was completed last spring and placed on the Sarnia-Lake Superior route. There was expended on permanent improvements and charged to current expenses \$24,849.64. Following is the financial statement:

ASSETS.	
Ten steamers .....	\$932,478.28
Buildings and plant .....	11,546.16
Merchandise and fuel .....	4,391.21
Insurance unexpired .....	6,277.77
Accounts receivable .....	25,799.83
Cash on hand .....	485.36
	<hr/>
	\$980,978.61
LIABILITIES.	
Capital stock .....	\$840,000.00
Rest account .....	90,000.00
Profit and loss .....	15,725.69
Bank of Toronto .....	29,602.39
Accounts payable .....	5,650.53
	<hr/>
	\$980,978.61
PROFIT AND LOSS ACCOUNT.	
Balance at credit, 1901 .....	\$ 12,356.11
Gross earnings of steamers .....	\$532,301.48
Total expenses .....	443,781.56
	<hr/>
Net profit .....	88,519.92
Premium on 2,786 shares at 10 per cent.....	\$ 27,860.00
Premium on sale of fourteen shares.....	673.50
	<hr/>
	28,533.50
	<hr/>
	\$129,409.53
APPROPRIATIONS.	
Half-yearly dividend paid July 1, 1902, on 5,600 shares, at 5 per cent. ....	\$ 28,000.00
Half-yearly dividend paid Jan. 2, 1903, on 8,400 shares, at 5 per cent. ....	41,773.84
Directors' compensation and expenses .....	3,910.00
Transferred to rest account .....	40,000.00
Balance at credit .....	15,725.69
	<hr/>
	\$129,409.53

#### MCDERMOTT'S PROPELLER COMPUTER

The screw propeller computer made by Prof. Geo. R. McDermott of the school of naval architecture, Cornell University, and which was recently described and illustrated in these columns, is fast meeting with favor. It is the size of a small book, composed of one stationary and two moveable discs carrying suitable scales, accurately engraved, and is designed for the purpose of furnishing a means, whereby the dimensions and proportions of screw propellers—diameter, pitch, surface, revolutions, slip and efficiency—can be quickly and accurately determined for any given case or set of conditions. Engineer-in-Chief Geo. W. Melville of the navy has had the computer examined and finds that it gives results with as great accuracy as the known data in such calculations will warrant. "Somewhat over a year ago," says Admiral Melville, "I directed Mr. Williams of my office to embody the results of Froude's experiments in a logarithmic chart, the curves of which were faired with great care. For testing the computer, we have, therefore, used the chart rather than the table given by Barnaby. We were at first somewhat skeptical about the computer, as it did not seem

possible to condense so many different curves into one or two arbitrary scales without introducing undesirable errors. The purely logarithmic scales of the computer we accepted as correct, after verifying the relations of exponents by comparing the scale lengths corresponding to the ratio 10. To test the arbitrary scales we selected seven widely separated points on the chart, and, working back to the screw data, compared these to the results given by the computer, all of which were tabulated." The tabular statement to which Admiral Melville refers gives results in a number of cases covering a wide range of propeller practice, showing that the computer gives values within one-half of 1 per cent. of that obtained by the use of Froude's original data.

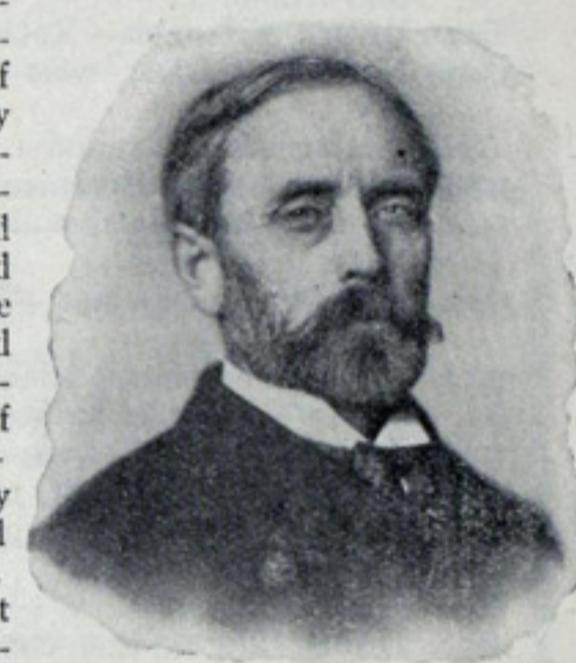
Mr. P. C. Walter of Chas. P. Willard & Co., Chicago, builders of marine engines and boilers, steam yachts, tug boats, etc., says in a letter to the Review: "I am free to admit that some of the intricate problems of propeller practice are very much of a task with me, and my first efforts to make use of Prof. McDermott's computer were not altogether successful, but an explanation from him regarding the working of the device has made several points clear to me and the results are now highly satisfactory. This recommendation is unsolicited."

#### COL. HENRY C. PROUT.

The announcement that Col. Henry Coates Prout, formerly editor-in-chief of the Railroad Gazette, has been appointed first vice-president and general manager of the Union Switch & Signal Co., was the occasion of genuine pleasure to his many friends and acquaintances, especially those associated with railroad affairs. The switch and signal apparatus manufactured by this company is used by the foremost railroads in the United States. The company was organized in 1883, with a capital of \$1,500,000, and has been engaged in the manufacture of every known form of automatic and semi-automatic railroad signals. The appointment of Col. Prout as the executive head of the company means that it has secured the best man obtainable for the post. In the fall of 1863, Col. Prout enlisted in a Massachusetts regiment. In the army of the Potomac he went through the Wilderness campaign. In 1865 he was mustered out, and two years later entered the University of Michigan, where he graduated with the degree of civil engineer. He had a few years work on railroad surveys and construction, and two summers were spent in taking surveys in the Rocky mountains. After this experience, he entered the service of the khedive of Egypt, as a major of engineers. He remained in that service about four years and a half and reached the grade of colonel in the general staff. After the first year, he went to the Soudan in command of an expedition to Kerdozan and Darfour, and thence he was sent to the head of the Nile as governor-general of the provinces of the Equator. Col. Prout's work here was largely administrative. He had 3,000 soldiers under him and was supreme over finance, civil and military affairs. After his return to America, he was for a little over a year civil engineer to the company out of which the Union Switch & Signal Co. grew. Col. Prout was in business in the city of New York for a few years, and in March, 1857, became the editor of the Railroad Gazette. As the editor of the Gazette he built an enviable reputation, well founded upon his high professional skill and his character as a man. He established a standard of editorship which will probably long continue as that journal's most valuable asset—one that will be hard indeed to live up to, much more to surpass. In recognition of Col. Prout's splendid work as an editor and journalist, Yale university last year gave him the honorary degree of master of arts.

The navy department has issued a circular defining the characteristics of the gunboats Dubuque and Paducah, bids for which are about to be called for. These vessels will be of the following dimensions: Length on load water line, 174 ft.; breadth, extreme, 35 ft.; mean draught to bottom of keel at trial displacement, 12 ft. 3 in.; mean draught, full load, about 13 ft. 5½ in.; total coal bunker capacity, about 200 tons; coal carried on trial, about 100 tons; displacement on trial, 1,080 tons. The vessels will be required to make 12 knots on trial. The hull will be composite to a point about 2 ft. 3 in. above load water line amidships, above which point it will be entirely steel. The armament will consist of six 4-in. rapid-fire guns, four 6-pounder rapid-fire guns, two 1-pounder rapid-fire guns and two Colt automatic guns. The engines will be vertical, twin-screw, triple-expansion type.

The Cleveland Punch & Shear Works has begun shipments on an order involving the supply of \$50,000 worth of tools to the Great Lakes Engineering Works, Detroit.



## NEW AND CORRECTED CHARTS.

J. D. Potter, 145 Minories, London, chart agent for the British admiralty, announces the publication of the following new charts:

No.  
 320 North American lakes, plans added—Michipicoten harbor, Gargantua harbor.  
 3316 West Indies, Puerto Rico, south coast—Guyanilla harbor.  
 3281 England, south coast—Portsmouth harbor, mooring ground, southern sheet.  
 2175 England, south coast—Poole harbor.  
 1607 England—River Thames entrance, North Foreland to the Nore.  
 3278 Channel islands, Jersey—St. Helier harbor.  
 2361 Germany, Elbe river—Outer light-vessel to Brunsbuttelkoog (plans—Cuxhaven road, Kaiser Wilhelm canal entrance, Brunsbuttelkoog).  
 3262 Germany, Elbe river—Brunsbuttelkoog to Hamburg (plans—Hamburg and Altona harbors).  
 3303 Black sea—Batum bay.  
 3288 Newfoundland—Northern arms of Canada bay.  
 3308 Newfoundland—Little river.  
 3310 Newfoundland—Bay of Islands, outer part.  
 3298 West Indies, Puerto Rico, east coast—Ensenada Honda and Puerca bay.  
 3304 South America, east coast—Rio de Janeiro to St. Sebastiao island.  
 602 British Columbia—Roche harbor and approaches.  
 3313 North America, west coast, Alaska—Yakutat (Bering) bay.  
 688 Madagascar—Tamatave.  
 3289 Red sea—Port Berenice.  
 3312 Eastern Archipelago—Madura island, south coast; Bunder road.  
 3311 Eastern Archipelago—Anchorage on the north coast of Java.  
 3314 Philippine islands, anchorages on the west coast of Luzon—San Fernando harbor; Port Santo Tomas.  
 3309 Japan, gulf of Tokvo—Uruga harbor.  
 28 England, south coast, plan added—Salcombe harbor.

The list of charts in which additions and corrections have been made is as follows:

No.  
 853 United States, east coast—St. Andrew sound to St. John river.  
 130 Leeward islands—Anguilla to Puerto Rico with approaches to Virgin islands.  
 28 England, south coast—Salcombe river.  
 34 England, south coast—Scilly isles.  
 2390 Scotland, west coast—East and West Lochs Roag.  
 2311 Norway, sheet IX—Fleina to Vestfiord and the Lofoten islands.  
 2302 Gulf of Bothnia, sheet VII—Tome point round the head of the gulf to Tauvo.  
 2647 France, west coast—Les Sables d'Olonne to Bourgneuf.  
 1799 Central America, east coast—Boca del Drago; Boca del Toro.  
 1358 South America, east coast—Union bay to Rio Negro.  
 1544 Central America—Panama road.  
 2087 Africa, south coast—Bashee river to Umtavuna river.  
 2088 Africa, south coast—Umtavuna river to Tugela river.  
 2089 Africa, east coast—Tugela river to Delagoa bay.  
 648 Africa, east coast—Delagoa bay to river Zambesi.  
 685 Africa, east coast—Bazaruto bay.  
 1810 Africa, east coast—River Zambesi to Mozambique harbor.  
 1809 Africa, east coast—Mozambique harbor to Bas Pekawi.  
 658 Africa, east coast—Ras Pekawi to Cape Delgado.  
 1808 Africa, east coast, sheet VIII—Cape Delgado to Kilwa.  
 690 Africa, east coast—Cape Delgado to Mikindani bay.  
 662 Africa, east coast—Kilwa point to Zanzibar channel.  
 1032 Africa, east coast—Channels between Ras Tikwiri and Mafia island.  
 664 Africa, east coast—Zanzibar to Malindi.  
 640 Africa, east coast—Pangani to Ras Kimbiji, two sheets.  
 1390 Africa, east coast—Chale point to Pangani.  
 848 Africa, east coast—Malindi to Juba.  
 759A Madagascar—Cape St. Andrew to Bevato island.  
 2762 Indian ocean islands—Comoro islands.  
 40 India, west coast—Karachi harbor.  
 934 Eastern Archipelago—Surabaya, Bali and Sapudi straits, etc.  
 3019 Japan—Tsu Saki to Kagara Sima with the channels to Imari.  
 651 Japan—Bungo channel.

The new steel steamer building at the Harlan & Hollingsworth Co.'s works, Wilmington, Del., for the Eastern Steamship Co. is to be named Calvin Austin. Mr. Austin is vice-president of the steamship company.

The secretary of the treasury has asked congress to provide two new revenue cutters to take the place of the MacLean and Hamilton which have outlived their usefulness.

## SHIP BUILDING AT NEWPORT NEWS.

Newport News, Feb. 25.—Overtures have been made by property owners of this place to the W. R. Trigg Co. of Richmond with a view of having its plant removed here. The Trigg company recently failed and, believing that the parties who are interested in it would prefer to be on deep water, two men of this city offered a free site of 150 acres with a frontage on James river of 2,000 ft., about three miles above the Newport News Ship Building & Dry Dock Co.'s plant and within one mile of the main line of the Chesapeake & Ohio road. A site of 100 acres a half mile from this property recently sold for \$50,000 cash. Lewis Nixon has also been approached with a view of locating here a ship yard to turn out tugs, river steamers, yachts and launches, and in the event the Trigg company will not accept the site the same offer will probably be made to him. The two men who own the 150 acres say they will give the site free to any one who can establish responsibility and who will build a ship yard that will employ at least 1,500 men. Much interest has been excited by the offer and it is believed that it will not go unaccepted very long.

The Newport News company has just been awarded a contract for repairing the British steamship Daventry, which went aground near Hatteras and damaged her outer and inner bottoms. The repairs will cost about \$40,000. Ship yards at New York, Philadelphia and Baltimore had representatives here to make estimates. Among them was Henry Konitzky, now with the ship yard at Sparrow's Point, Md., and the first general superintendent of the Newport News works. Mr. Konitzky was succeeded in the early 90's by Sommers N. Smith, who was later succeeded by Walter A. Post, the present general superintendent.

An effort is being made by the people of Newport News to have the ship yard fix April 23 as the date for the launching of the armored cruiser West Virginia and if possible to have the Maryland, a sister ship, put overboard the same day. The military and firemen will give a carnival during the week of the 20th, and Thursday, April 23, will be the big day. Excursions will be run here from all parts of the state on that day and the people of the city are anxious to have a launching attraction in the morning in order to have the thousands of West Virginians and others who will come to see the event here on the same day. It is not believed that a double launching will be arranged, although the ship yard has made no announcement yet.

The new battleship Maine arrived in Hampton Roads last week and came up to Newport News Monday for coal. Athletic events were held aboard the monitor Puritan here on Monday. The Puritan will remain here all the week. Flags were at half mast at the navy yard last Monday in memory of Rear Admiral Wilde. The torpedo boat destroyer Truxton, on her last trial run in the Roads, made 29 knots. The torpedo boat destroyer Barry was commissioned at the navy yard several days ago. The new torpedo boat destroyer Whipple will have her speed trial March 9. It is again reported that Germany will send the cruisers Gazelle and Falke from the South Atlantic station here to be overhauled.

When the new Atlantic Transport Line steamship Massachusetts passed in the Capes and proceeded to Baltimore to load her first cargo, the Baltimore, Norfolk and other papers referred to the ship as the largest vessel that had passed in the Capes since the Great Eastern. An erroneous impression was created. The largest ships that have passed the Capes are the Pacific liners Korea and Siberia, built at Newport News. The Korea is 572 ft. 4 in. in length over all and has a displacement of 18,400 tons, with a draught when loaded of 27 ft. The dimensions of the Siberia are the same. The Massachusetts is 507 ft. over all, displaces 17,200 tons and has a draught when loaded of 27 ft. 4 in. The Massachusetts was built by the New York Ship Building Co. at Camden, N. J., and a sister, the Maine, was launched at Sparrow's Point, Md., last week.

Judge Edmond. Waddill, Jr., in the United States court, has handed down a decision that fixes the next procedure in the matter of the condemnation of the Schmoele tract back of Portsmouth, which the United States government desires for additional navy yard purposes. There are 272 acres in the tract and a commission was appointed to condemn the property and fix a just compensation for the owners. The commission appraised the property and fixed its value at \$572,000. The government claimed that this was excessive and protested against a confirmation of the commissioners' report. The United States district attorney argued that a jury of twelve and not a freehold board of five should determine the value of the property and moved to set aside the finding. The court ruled that this was not sufficient ground for ignoring the commission's report, but held, after hearing evidence, that the ends of justice would best be met by a reappraisal of the property and the report of the condemnation commission was not confirmed. The next procedure will be determined later.

It has been said that the new dry dock at Hunter's Point, Cal., is the largest in America. This is an error. The new dry dock here is the largest in this country and really the largest in the world, as it has a larger water capacity than any other. The Newport News dock is nearly 100 ft. longer, considerably wider and 2 ft. deeper than the Hunter's Point dock.

## TRADE NOTES.

The Delta Hardware Co., Escanaba, Mich., announces special arrangements for supplying the vessel trade during the coming season. They are wholesale and retail dealers in general hardware and carry a complete line of marine supplies.

Abram Smith & Son, Algonac, Mich., ship builders and rebuilders, have issued a calendar which is one of the most amusing that has come to this office during the year. The picture is the photo of a Kentucky wedding, the principals being colored. "Honey, does you lub your man," the minister is saying to the bride who looks large and determined enough not only to love him but to lick him also if necessary. The picture is from life.

"Tahiti, the Golden," is the title of a little booklet which the Oceanic Steamship Co. has just published. The letter press matter is by Charles Keeler and the book is printed upon deckle-edge paper, illustrated with half-tone photos which are, of course, printed upon smooth paper. The illustrations are upon brown tone-blocks which bring out the character of the photos well. The story has an illuminated cover and is nicely told indeed. It makes one long to see this paradise of the Pacific.

C. W. Farr, 120 W. Jackson boulevard, Chicago, who has been at work for a long time past on an electric sounding machine, has arrangements made for a series of tests of the machine on lake vessels during the coming season and will not try to push its sale until these trials are completed, although he is fully convinced himself that improvements in the machine since it was first brought out have made it a success. The Farr device can be clamped to the rail of any steamer. It is 20 in. high, 16 in. wide and 8 in. deep, weighing only 100 lbs. Soundings can be taken with a vessel under full headway. A lead sinker goes overboard; when it strikes bottom an electric circuit is closed; a bell rings in the machine and a hand on a dial points to the depth in fathoms. The reel can be operated with a crank or an electric motor.

The characteristic feature of the catalogues of Jenkins Bros., 71 John street, New York, known the world over on account of their steam specialties and especially their valves, is what they term "a fair offer." This announcement, prominent in their printed matter, is thus put as to valves: "If you will put a Jenkins Bros. valve on the worst place you can find, where you cannot keep other valves tight, and if it is not perfectly tight, or does not hold steam, oils, acids, water, or other fluids, longer than any other valve, you may return it, and your money will be refunded; and of their packing they say "use the Jenkins standard '96 packing on the worst joint you have and if it is not as we represent it we will refund the money." This company's 1903 catalogue is at hand. It is convenient of size—just large enough to give necessary information regarding various types of valves, not slighting, of course, their other specialties, which include packing, injectors, steam traps, discs, gaskets, gauge cocks, etc.

LIGHTHOUSE ESTABLISHMENT,  
OFFICE OF ENGINEER, NINTH LIGHTHOUSE DISTRICT,  
CUSTOM HOUSE, MILWAUKEE, WIS., FEB. 17, 1903.

## POSITIONS IN THE LIGHTHOUSE SERVICE.

Notice is hereby given that an examination will be held at this office for the purpose of perfecting an eligible list for the positions of Master, Mate, Second Mate, Engineer and Assistant Engineer on the Lighthouse Tender in this district, which includes Lake Michigan, Green Bay and tributary waters lying west of a line drawn across the Straits of Mackinac at Mackinac Point, Michigan; also for the positions of superintendents, masons, bricklayers, plasterers, carpenters and painters in the lighthouse service in this district.

One position of superintendent will require a machinist who understands the construction and repair of boilers and machinery.

The other position of superintendent will require a general knowledge of building construction, qualities of material and ability to handle working force.

Persons who wish to apply for the foregoing positions should obtain the proper blank forms of application from this office, either in person or by mail, and after filling them out return them to this office.

Applicants need not appear in person.

Thirty days from the date of this notice, all applications received will be examined, the applicants graded according to merits and a list of those eligible for appointment sent to the Lighthouse Board. J. G. WARREN, Major, Corps of Engineers U. S. A., Engineer, Ninth Light-House District, Chairman. Local Civil Service Board.

d. Mar 12.

ELIAS GUNNELL,  
PRESIDENT.

THOS. J. PRINDIVILLE,  
VICE-PRESIDENT.

L. E. GEER,  
SEC'Y AND TREAS.

CHARLES C. WEST,  
MANAGER.

# MANITOWOC DRY DOCK COMPANY,

SHIP BUILDERS.

FACILITIES FOR REPAIRS OF STEEL AND WOODEN VESSELS.

DRY DOCKS AND MAIN OFFICE: MANITOWOC, WIS.  
GEO. B. BURGER, SUPT.

BRANCH YARD: 34 ROBERTS STREET, CHICAGO.  
THEODOR KNUDSON, SUPT.

## United Marine Mfg. & Supply Co.,

MANUFACTURERS OF AND  
DEALERS IN

ALBERT C. JAHL, General Manager,  
100 William St., New York, U. S. A.

## ELECTRICAL MATERIAL

FOR SHIPS AND FORTIFICATIONS.

## FROM STEELTON TO MANDALAY.

"From Steelton to Mandalay" is the title of about as good a bit of bookmaking as we have had the pleasure of seeing for some time. It is issued by the Pennsylvania Steel Co. and is an account of the erection of the Gotteik viaduct in one of the Shan states of upper Burma, 460 miles from Rangoon, the nearest seaport, and 80 miles east of Mandalay on the road to Kunlon which is on the frontier of China. The structure which was built for the Burma Railways Co., Ltd., spans the Gotteik gorge, formed by the Chungzoune river. The bridge was erected by the Pennsylvania Steel Co. All the pieces of the bridge were manufactured in America and transported to Burma. The contract was let in April, 1899, the first consignment of material arrived in Rangoon in October of that year, the actual work of erection was started in December and the viaduct was practically completed on Nov. 1, 1900. The viaduct is 2,260 ft. long and consists of ten spans of 120 ft. triangulated girders, and seven spans of 60 ft. plate girders. The supports on which the girders rest and which constitute the more striking features of the viaduct, consist of steel towers. These towers are each made up of two trestles 24½ ft. wide across the top, and splaying outwards with a batter of 2½ in. in the foot; the two trestles of the tower are spaced 40 ft. apart and are connected at the top by 40-ft. plate girders and the whole is securely braced in all directions. The rails are at a height of 2,135 ft. above mean sea level and are 825 ft. above the Chungzoune stream which flows through the natural tunnel below. The height of the rails above the ground at the highest pier is 325 ft. The book is illustrated with a great variety of photographs, outlined and vignetted, and taken all the way from Steelton to Mandalay.

## "KEARSARGE" ASBESTO-METALLIC PACKINGS

Made from pure Asbestos yarn and fine brass wire, firmly woven together

## GASKETS

will not blow out, will hold against any steam pressure will stand highest temperature.

Used exclusively on the hand holes of Babcock & Wilcox and other water-tube boilers.

## SHEET PACKING

The most reliable flat packing on the market for all conditions of steam service

PISTON ROD  
PACKING

For high speed, high temperature, high pressure, with or without wire interwoven.

FLANGE JOINT  
GASKETS

More reliable than rubber or metallic and cost much less. Will not blow out. Unaffected by high temperature. Without expansion or contraction. Works perfectly whether conditions are favorable or unfavorable.

Write for samples, prices and full information.

NEW YORK  
MILWAUKEE  
CHICAGO  
ST. LOUIS  
BOSTON

H. W. JOHNS-MANVILLE CO.  
260 WILLIAM ST., NEW YORK

PHILADELPHIA  
CLEVELAND  
PITTSBURG  
NEW ORLEANS  
LONDON

**GENERAL PNEUMATIC TOOL CO.**

The General Pneumatic Tool Co., recently incorporated, is a reorganization of the business of the Havana Bridge Works, Montour Falls, N. Y., which has been engaged for some years in the production and sale of improved pneumatic tools. The new corporation will manufacture pneumatic tools, compression riveting machines, pneumatic motor hoists, air compressors, and cranes, etc. Extensive improvements in the manufacturing plant have already been made and an additional building will be erected for a store and engine house early in the spring. A portion of the new equipment of machinery is already in operation but there is yet to be purchased screw machines, turret lathes, shaper, universal grinder, gear cutter, milling machine and engine lathes. The company's tools have received a very gratifying recognition and orders for compression riveting machines, pneumatic hammers and pneumatic motor hoists covering its capacity for several months are already booked. Several new types of compression riveting machines have recently been brought out in addition to those which have been on sale for several years. The company says that when all its tools are ready for the market they will constitute one of the most complete lines of pneumatic machinery ever handled by any concern in the business.

Senator Hanna's efforts to put the shipping bill, as it passed the senate last year, through the house at this session has ended in failure. The committee on merchant marine of the house has refused to return it to that body, even with an adverse report. In other words it remains in committee to die. Senator Hanna must have believed that he could have passed the bill in the

**Tug for Sale.**

Tug Maurice W. for sale. Practically new; 48 ft. over all, 12 ft. beam, 5½ ft. draught. Engine, boiler and wheel of Sutton Bros. make. Engine 10x12; 100 lbs. steam; 50 in. wheel. Cheap for cash. Address L. E. Welch, Mackinaw City, Mich. t. f.

**Engine for Sale**

For Sale.—Fore and aft compound engine, 9 and 12x16 in.; Sutton build. Dean pump to match. Been run two months. Address William Tallman, 262 West Third St., Erie, Pa. Feb. 26.

house, otherwise he would never have made the attempt. This disposes of the shipping bill as far as the present measure is concerned. It will be necessary now to go all over the ground again in the senate. There was considerable opposition to the senate bill, the Merchants' Association of New York in particular making an emphatic protest.

Vessels classed and rated by the American Bureau of Shipping in the Record of American and Foreign Shipping recently are: American screw steamer Henry Wilson, American screw steamer M. F. Plant, American screw steamer Massachusetts, British screw steamer Venture, American three-masted schooner Twilight, American three-masted schooner E. H. Weaver, American three-masted schooner Stephen G. Loud, American schooner Hope Sherwood, American schooner Robert Graham Dun, American barge Emilie, American barge Florrie, American barge Gwennie.

It appears the government is again desirous of marking the dreaded Diamond shoal, Cape Hatteras, with a lighthouse. Two attempts to build a lighthouse upon these sands have failed and the shoal is now marked with a lightship. A bill has just been reported favorably to the house to appropriate \$590,000 for a lighthouse.

If you want  
to KNOW, **WHY**

**Dearing Water  
Tube Boilers  
are best? ? ?**

Drop us a postal

**Dearing Water Tube Boiler Company**  
288 to 296 Fort St., West. DETROIT, MICH.

# BELLEVILLE WATER-TUBE BOILERS

**NOW IN USE (AUGUST, 1902)**

**On Board Sea-going Vessels, NOT INCLUDING New Installations Building or Erecting.**

French Navy	-	-	-	-	268,020 H. P.
English Royal Navy	-	-	-	-	745,900 "
Russian Imperial Navy	-	-	-	-	184,900 "
Japanese Imperial Navy	-	-	-	-	110,700 "
Austrian Imperial Navy	-	-	-	-	32,900 "
Italian Royal Navy	-	-	-	-	13,500 "
Chilian Navy	-	-	-	-	26,500 "
Argentine Navy	-	-	-	-	13,000 "
The "Messageries Maritimes" Company	-	-	-	-	87,600 "
Chemins de fer de l'Ouest: (The French Western Railway Co.)	Steamships plying between Dieppe and Newhaven	-	-	-	18,500 "
Total Horse Power of Boilers in Use	-	-	-	-	1,501,520

**WORKS: Ateliers et Chantiers de l'Ermitage, at Saint-Denis (Seine), France.**

**TELEGRAPHIC ADDRESS: Belleville, Saint-Denis-Sur-Seine.**

## ITEMS OF GENERAL INTEREST.

It is reported that the Canadian Pacific Railroad Co. has acquired the Atlantic fleet of the Elder-Dempster Steamship Co.

The submarine torpedo boat Grampus, built by the Union Iron Works, San Francisco, is to undergo a submarine test in a few days.

The oil tank steamship Narragansett, the largest vessel of her kind in the world, was launched at Greenock last week for the Anglo-American Oil Co. She can carry 11,000 tons of oil in her tanks.

The steam yacht Noma, built by the Burlee Dry Dock Co., Port Richmond, Staten Island, for William B. Leeds, the president of the Chicago & Rock Island railroad, underwent her trial trip last week and attained a speed of 20½ knots in a heavy sea.

The New Jersey Pneumatic Crane Co. has been incorporated in New Jersey with a capital stock of \$100,000. The incorpora-

tors are Louis B. Dailey, Paul Tissen and J. M. Mitchell. It is understood that the company has ample financial backing and intends to engage generally in the manufacture of pneumatic tools and air compressors of every description.

At the recent meeting of the Canadian Society of Civil Engineers Mr. A. W. Robinson of Montreal read a paper upon the hydraulic dredge King Edward VII, which has a capacity for discharging 500 cu. yds. per hour through a pipe 1,500 ft. long. Mr. E. G. M. Cape read a paper upon the "Industries of the Consolidated Lake Superior Co." being a description of the pulp and alkali works.

Bids for supplying 5,666 tons of Krupp armor for the battleships Louisiana and Connecticut were opened by the navy department last week. The Carnegie Steel Co. and the Bethlehem Steel Co. were the only bidders, agreeing to supply the armor at from \$400 to \$420 per ton. The total of the bids was \$2,333,640. The contract will be divided equally between the two companies.

The following steamers of the Oceanic Steamship Co.'s fleet are to be equipped with the hydro-carbon system (fuel economy) which was described in a recent issue of the Review, and which is being applied to vessels of the lakes by the Great Lakes Engineering Works of Detroit: Sierra, 6,200 tons; Sonoma, 6,200 tons; Ventura, 6,200 tons; Almeda, 3,200 tons; Mariposa, 3,200 tons; Australia, 3,000 tons. Orders to equip these vessels resulted from the showing made on the steamer Zealandia of the same fleet after equipment with the hydro-carbon system.

## "Seaboard Steel Castings"

### A Guarantee of Quality.

Open Hearth Steel Castings of the Highest Grade for Locomotive, General Machinery and Shipbuilding Work.

Subject to U. S. Government, Lloyds, Railroad and Other Highest Requirements.

**Seaboard Steel Casting Co., Chester, Pa.**

**FOR SALE**

THIS PASSENGER STEAMER  
AT A BARGAIN. MUST SELL  
AT ONCE . . . . .



Fully equipped with electric lighting plant. 10 inch search-light.

Length 76 feet, draught 6 ft. 4 in., rebuilt spring 1902.

For full particulars, address



W. R. GREGORY,  
810 Royal Insurance  
Building,  
CHICAGO ILL.  
Feb. 26

**PITTSBURGH WHITE METAL CO.**

MANUFACTURERS OF THE BEST

**BABBITT and ANTI-FRICTION**

**Metals**

Known for any Purpose.

Made from the Best Materials.

Price and Quality Guaranteed and Always Consistent with the Market.

**PITTSBURGH, - PA.**

U. S. Engineer Office, Milwaukee, Wis., Jan. 31, 1903. Sealed proposals for building crib breakwater at Manitowoc Harbor, Wis., will be received here until 3 o'clock, p.m., March 2, 1903, and then publicly opened. Information furnished on application. J. G. WARREN, Major, Engineers. Feb. 26

U. S. Engineer Office, Milwaukee, Wis., Jan. 31, 1903. Sealed proposals for furnishing Oregon fir timber and plank will be received here until 3 o'clock, p.m., March 2, 1903, and then publicly opened. Specifications, blank forms, and all available information will be furnished on application to this office. J. G. WARREN, Major, Engineers. Feb. 26

U. S. Engineer Office, Milwaukee, Wis., Jan. 31, 1903. Sealed proposals for building crib piers at Sheboygan Harbor, Wis., will be received here until 3 o'clock, p.m., March 2, 1903, and then publicly opened. Information furnished on application. J. G. WARREN, Major, Engineers. Feb. 26

Treasury Department, U. S. Life-Saving Service, Washington, D. C., Feb. 17, 1903. Sealed proposals will be received at this office until 2 o'clock, p.m., of Friday, Mar. 6, 1903, and then publicly opened, for the construction of a life-saving station and wharf at Racine, Wis. Specifications and drawings, forms of proposals, etc., can be obtained upon application to the Superintendents of Construction of Life-Saving Stations, 17 State street, New York City; to the Assistant Inspector, 12th Life-Saving District, Room 548 Rand-McNally Building, Chicago, Ill.; or to this office. S. I. KIMBALL, General Supt. Feb. 26

Sealed proposals will be received at the office of the Light House Engineer, Buffalo, N. Y., until 12 o'clock m., of Thursday, Mar. 5, 1903, and then opened, for furnishing the materials and labor necessary for the construction of a keeper's dwelling at South Buffalo light station, N. Y., in accordance with specifications, copies of which, with blank proposals and other information, may be had upon application to Major T. W. SYMONS, U. S. A. Engineer. Feb. 26

U. S. Engineer Office, Milwaukee, Wis., Jan. 31, 1903. Sealed proposals for building crib piers, crib breakwater, pile revetment, removal of portion of old pier, and dredging at Waukegan Harbor, Ill., will be received here until 3 o'clock, p.m., March 2, 1903, and then publicly opened. Specifications, blank forms, and all available information will be furnished on application to this office. J. G. WARREN, Major, Engineers. Feb. 26

U. S. Engineer Office, Grand Rapids, Mich., Feb. 2, 1903. Sealed proposals for repair of piers at Pentwater and White Lake, Mich., and repair of piers and revetment at Charlevoix, Mich., will be received here until 3 p.m., March 4, 1903, and then publicly opened. Information furnished on application. CHARLES KELLER, Capt., Engrs. Feb. 26

U. S. Engineer Office, Milwaukee, Wis., Jan. 31, 1903. Sealed proposals for dredging and rock removal at Sturgeon Bay and Lake Michigan Ship Canal, Wis., will be received here until 3 o'clock, p.m., March 2, 1903, and then publicly opened. Specifications and all available information will be furnished on application to this office. J. G. WARREN, Major, Engineers. Feb. 26

U. S. Engineer Office, Duluth, Minn., Feb. 6, 1903. Sealed proposals for dredging about 40,000 cu. yds. at Asland, Wis., and Ontonagon, Mich., will be received here until 10 a.m., Mar. 9, 1903, and then publicly opened. Information on application. D. D. GAILLARD, Capt., Engrs. Mar. 5

U. S. Engineer Office, 57 Park st., Grand Rapids, Mich., Feb. 9, 1903. Sealed proposals for dredging harbors on east shore of Lake Michigan will be received here until 3 p.m., Mar. 11, 1903, and then publicly opened. Information furnished on application. CHAS. KELLER, Capt., Engrs. Mar. 5

U. S. Engineer Office, Duluth, Minn., Feb. 7, 1903. Sealed proposals for building in place the concrete south pier at Superior Entry, Wis., will be received here until noon, Mar. 9, 1903, and then publicly opened. Information on application. D. D. GAILLARD, Capt., Engrs. Mar. 5

U. S. Engineer Office, Buffalo, N. Y., Feb. 3, 1903. Sealed proposals for pier extension at Little Sodus Bay, N. Y., and breakwater extension at Cape Vincent, N. Y., will be received here until 11 a.m., Mar. 5, 1903, and then publicly opened. Information furnished on application. T. W. SYMONS, Major, Engrs. Mar. 5

U. S. ENGINEER OFFICE, Galveston, Tex., Feb. 23, 1903. Sealed bids, in triplicate, for improving Aransas Pass, Tex., by removing part of old jetty, will be received until 2 p.m., Mar. 25, 1903, and then publicly opened. For information apply to C. S. RICHE, Capt., Engrs. Mar. 19

**PNEUMATIC  
TOOLS**

FOR ALL  
PURPOSES  
SIMPLEST AND BEST

**RAILWAY APPLIANCES  
COMPANY**

CONSOLIDATED WITH THE Q-C COMPANY  
GENERAL OFFICES  
OLD COLONY BUILDING  
CHICAGO.

NEW YORK  
OFFICES  
114 LIBERTY ST.

ANTONIO C. PESSANO,  
President and General Manager.

GEORGE H. RUSSEL,  
Vice President.

JOHN R. RUSSEL,  
Secretary-Treasurer.

# GREAT LAKES ENGINEERING WORKS

DETROIT, MICH.

## Steel Ship Builders—

We have under construction a complete Ship Building Plant, modern in every detail and capable of handling the **LARGEST SHIPS** which the trade of the Great Lakes will require; also

## Floating Dock—

A Floating Dock of all steel construction and equipped with the best pumping machinery and appurtenances, and with a capacity for Docking the largest Boats afloat or which may be built.

## Marine Engines—

We build High Grade Engines for Lake and Ocean Service.

## Propeller Wheels—

Improved designs of high efficiency, made of Semi Steel, either whole or sectional.

## Hydro Carbon System—

We are the sole owners of the rights for applying this system to the Steamers of the Great Lakes. If your boilers are using too much coal, if you are short of steaming capacity, if you want to convert the objectionable black smoke into money, the HYDRO CARBON SYSTEM should receive your attention, as it successfully and economically handles each of the above cases.

## Hydraulic Dredges—

We build all sizes for any service.

## Marine Repairs—

and Supplies of all kinds, and Heavy forgings.

## Books on Naval Architecture, Ship Yard Practice, Seamanship, Etc.

**AMERICAN MERCHANT MARINE**—Winthrop L. Marvin. A history of Am. Ships and Shipping. \$2.

**AMERICAN PRACTICAL NAVIGATOR**—Nathaniel Bowditch. \$2.25.

**DATA BOOK**—Naval architects and engineers' data book. By T. H. Watson. A reliable and simple means of recording valuable data, etc., of vessels and engines. Size of book, 8 $\frac{1}{2}$  in. by 5 in., cloth. \$2.

**ELEMENTARY STEAMSHIP**—by Barker. New and enlarged edition. \$2.50.

**ELEMENTS OF NAVIGATION**—Henderson. \$1.

**HAND BOOK OF ADMIRALTY LAW**—Robt. M. Hughes. \$3.75.

**HINTS ON LEGAL DUTIES OF SHIPMASTERS**—B. W. Ginsburg. \$1.75.

**ILLUSTRATED NAUTICAL ENCYCLOPEDIA**—Howard Patterson. \$3.

**INTERNATIONAL SIGNAL CODE**—Bureau of Navigation. New Edition. \$3.00.

**KNOW YOUR OWN SHIP**—Thos. Walton. \$2.50.

**MANUAL OF ALGEBRA**—R. C. Buck. For the use, more especially, of young sailors and officers in the merchant navy; numerous examples and exercises. \$1.50.

**MARINE INSURANCE**. W. Gow. \$1.50.

**MARINER'S COMPASS IN AN IRON SHIP**: How to keep it efficient and use it intelligently. J. W. Dixon. \$1.

**MODEL ENGINES AND SMALL BOATS**—N. M. Hopkins. New methods of engine and boiler making; ship design and construction; fifty illustrations. \$1.25.

**MODERN SEAMANSHIP**—Lieut. Com. Austin M. Knight, U. S. N. Adopted as the text book of the United States Naval Academy. \$6.

**MODERN PRACTICE OF SHIP BUILDING IN IRON AND STEEL**—Samuel J. P. Thearle. 2 volumes. Second edition, revised and enlarged. \$5.25.

**NAVAL ARCHITECTURE**: A treatise on laying off and building wood, iron and composite ships. Samuel J. P. Thearle. In two volumes. \$3.

**NAVAL ARCHITECTURE**: A manual on laying off iron and steel vessels—Thos. H. Watson. Valuable for naval architects as well as beginners in ship yards. \$5.

**NAVAL ARCHITECTURE**—Sir W. H. White. New Edition. 750 pages. \$9.

**NAVAL ARCHITECTS AND SHIPBUILDER'S POCKET BOOK**—Clement Mackrow. Formulae, rules and tables, and marine engineers' and surveyors' Handy Book of Reference. Eighth edition, revised and enlarged. \$5.

**NAVIGATION SIMPLIFIED**—C. E. McArthur. Containing all problems required for U. S. Local Inspector's Examination of Masters and Mates of seagoing vessels \$1.00.

**POCKET BOOK OF MARINE ENGINEERING, RULES AND TABLES**—Seaton and Routhwaite. For marine engineers, naval architects, superintendents and others engaged in construction of marine machinery. \$3.

**PRACTICAL INFORMATION ON THE DEVIATION OF THE COMPASS**, for the use of Masters and Mates of Iron ships—J. T. Towson. \$2.

**PRACTICAL SEAMANSHIP FOR USE IN THE MERCHANT SERVICE**: Including all ordinary subjects; also Steam Seamanship. Wreck Lifting, Avoiding Collision, Wire Splicing, Displacement, and everything necessary to be known by seamen of the present day. Second edition, Illustrated. John Todd and W. B. Whall. \$8.40.

**RESISTANCE AND PROPULSION OF SHIPS**—Durand. \$5.

**RESISTANCE AND PROPULSION OF SHIPS**—By Taylor. \$3.75.

**SELF-INSTRUCTOR IN NAVIGATION AND PRACTICAL GUIDE** to the examinations of the U. S. Government Inspectors for masters and mates of ocean going steamships and sailing vessels—Capt. W. J. Smith. Second edition, revised and enlarged. Cloth bound, \$2. Paper bound, \$1.50.

**SELF-INSTRUCTION IN THE PRACTICE AND THEORY OF NAVIGATION**—Earl of Dunraven. Two volumes. \$7.

**SHIP BUILDING**: Tables for constructing ship's lines. Second edition. Archibald Hogg. \$2.

**SIMPLE ELEMENTS OF NAVIGATION**—Young. New second edition. \$2.

**STABILITY OF SHIPS**—Sir E. J. Reed. \$8.40.

**STEEL SHIPS**: Their Construction and Maintenance. A manual for ship builders, ship superintendents, students and marine engineers. Thos. Walton. \$5.50.

**TEXT BOOK OF NAVAL ARCHITECTURE**—J. J. Welch. \$1.50.

**TEXT BOOK OF SEAMANSHIP**—Com. S. B. Luce, U. S. N. Equipping and handling of vessels under sail or steam. \$10.

**THEORETICAL NAVAL ARCHITECTURE**: A treatise on the calculation involved in naval design. Samuel J. P. Thearle. In two volumes. \$3.50.

**THEORETICAL NAVAL ARCHITECTURE**—E. L. Attwood. Text book: 114 diagrams. \$2.50.

**"WRINKLES" IN PRACTICAL NAVIGATION**. Ninth edition, revised. S. T. S. Lecky. \$8.40.

## Books on Marine Engineering, or the Operation of Engines, and for Beginners in the Engine Room.

**AIDS TO ENGINEERS' EXAMINATIONS**, with Questions and Answers—N. Hawkins. \$2.

**AMERICAN MARINE ENGINEER**—By Edwards. \$2.50.

**ARITHMETIC OF THE STEAM ENGINE**—E. S. Gould. \$1.

**ELECTRIC LIGHTING**—Atkinson. \$1.50.

**ELECTRIC LIGHTING FOR MARINE ENGINEERS**: or how to light a ship by the electric light and how to keep the apparatus in order. S. F. Walker. \$2.

**ENGINEER'S EPITOME**—N. J. Smith. A collection of figures, facts and formulae for engineers. 50 cents.

**ENGINEER'S MANUAL OF LOCAL MARINE BOARD EXAMINATIONS**—By Ainsley. \$5.

**ENGINES AND ENGINE RUNNING**—Joshua Rose. For the use of those who desire to pass an examination to take charge of an engine or boiler; illustrated. \$2.50.

**EXAMINATION QUESTIONS AND ANSWERS**—Emory Edwards. 900 examination questions and answers for young engineers and firemen who desire to obtain marine licenses. \$1.50.

**HOW TO RUN ENGINES AND BOILERS**. Practical instruction for young engineers and steam users. E. P. Watson. New fifth edition. \$1.

**INDICATOR PRACTICE**—Hemenway. \$2.

**KEY TO ENGINEERING**—Invaluable to engineers and firemen about to take examinations. Written in the plainest language and in the form of questions and answers. Postpaid, 75 cents.

**KEY TO ENGINES AND ENGINE RUNNING**—Joshua Rose. For use of those desiring to pass examination to take charge of an engine or boiler. \$2.50.

**LESSONS AND PRACTICAL NOTES ON STEAM, THE STEAM ENGINE, PROPELLERS, ETC.**—King. \$2.

**LIBRARY OF STEAM ENGINEERING**—John Fehrenbach, M. E. \$5.

**MARINE BOILERS**: A treatise on the Causes and Prevention of their Priming, with remarks on their general management. Reed. \$2.

**MARINE BOILERS**—Stromeyer. \$5.

**MARINE BOILERS**—L. E. Bertin. 250 illustrations, designs and tables. \$7.50.

**MARINE ENGINES**—R. Murray. \$1.80.

**MARINE PROPELLERS**—By Barnaby. \$4.50.

**MARINE STEAM ENGINE**: Its Construction, Action and Management—Carl. Busley. A manual and book of reference for engineers, students, ship owners, officers of the navy and mercantile marine, and all interested in steam navigation. Thoroughly revised; third edition \$15.00.

**MARINE STEAM ENGINES**—Sennet & Oram. \$6.

**MECHANICS' AND ENGINEERS' POCKET BOOK**, including Naval Architecture, Steam and the Steam Engine, Steam Vessels, etc. 64th edition, 1050 pages. Chas. H. Haswell. \$4.

**MECHANICAL ENGINEERS' POCKET BOOK**—Wm. Kent. Reference book or rules, tables, etc. \$5.

**MODERN EXAMINATIONS OF STEAM ENGINES**—W. H. Wakeman. \$1.50.

**NAUTICAL ENCYCLOPEDIA, ILLUSTRATED**—Howard Patterson. Complete from Standpoint of Marine Engineer and Naval Architect. \$3.

**POCKET BOOK OF MARINE ENGINEERING, RULES AND TABLES**—Seaton and Routhwaite. For marine engineers, naval architects, superintendents and others engaged in construction of marine machinery. \$3.

**PRACTICAL MARINE ENGINEERING**, for marine engineers and students with aids for applicants for marine engineers' licenses. Prof. W. F. Durand. \$5.00.

**QUESTIONS AND ANSWERS FOR MARINE ENGINEERS**—Theo. Lucas. Containing 807 questions, with fully explained illustrated answers. \$2.

**QUESTIONS AND ANSWERS**, sixth edition—Stephen Roper. \$2.

**REED'S ENGINEERS' HAND BOOK**—New Edition; illustrated by 845 diagrams and 86 large plates. \$5.

**REED'S KEY** to Reed's Hand Book—Contains working of all questions given in examination papers. \$3.

**RESISTANCE AND PROPULSION OF SHIPS**—W. F. Durand, principal of school of marine construction. Cornell University. \$5.

**ROPER'S ENGINEERS' HANDY BOOK** for Steam Engineers and Electricians. Revised and enlarged. \$3.50.

**SCREW PROPELLERS AND MARINE PROPULSION**—I. McKim Chase. \$2.50.

**SLIDE VALVE**—Julius Begtrup. Special reference to Modern Practice in the United States. \$2.

**SLIDE VALVE, SIMPLY EXPLAINED**—W. J. Tenant. \$1.00.

**SLIDE VALVES**—C. W. MacCord, Jr. A book for practical men on the principles and methods of design. \$1.50.

**SMALL ENGINES AND BOILERS**—Egbert P. Watson. A manual of concise and specific directions for construction of small steam engines and boilers of modern types; Illustrated. \$1.25.

**STEAM AND THE MARINE STEAM ENGINE**—Jno. Yeo. \$2.50.

**STEAM BOILERS**—Joshua Rose. Practical treatise, construction and examination. Seventy-three engravings. \$2.50.

**STEAM BOILER**: Its Care and Management. Stephen Roper. \$2.

**STEAM ENGINE: Theory and Practice**—Ripper. \$2.50.

**TRIPLE AND QUADRUPLE EXPANSION ENGINES AND BOILERS AND THEIR MANAGEMENT**—A. Ritchie Leask. Third edition, revised. \$2.

**WATER TUBE BOILERS**—Fifth revised and enlarged edition of HOW TO RUN ENGINES AND BOILERS—F. P. Watson. Practical instruction for young engineers and steam users. \$1.

Sent to any address, carriage prepaid, at prices named.

The Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland, Ohio.

## THE CLEVELAND TRUST COMPANY

Capital \$500,000.00

Surplus \$575,000.00

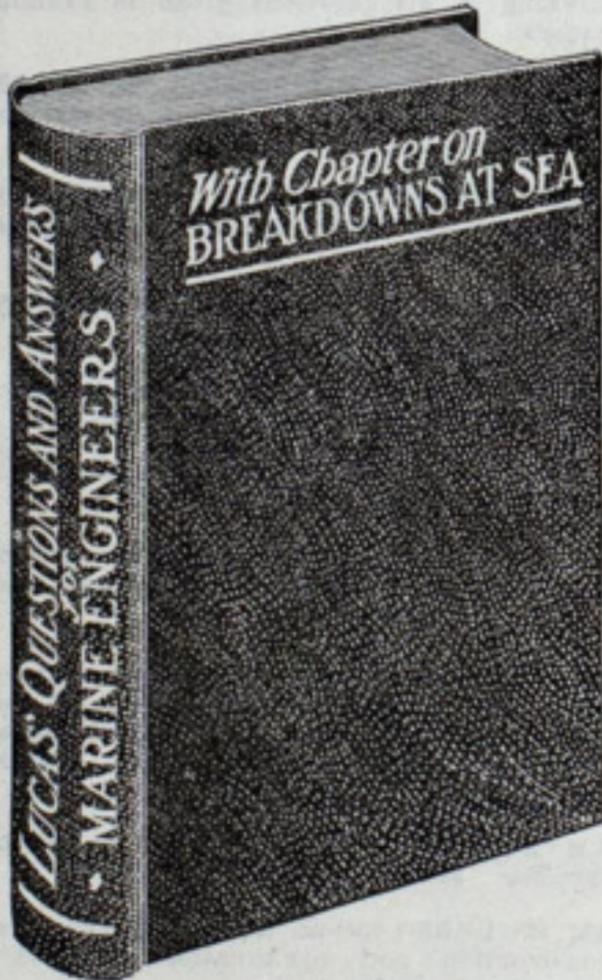
PAYS four per cent interest on time deposits—two per cent on check accounts.

ACTS in any fiduciary capacity—as trustee of bond issues; as registrar and transfer agent of the stock of corporations; as a disinterested third party carrying out the provisions of an agreement between two interested parties.

STORES anything of value for any length of time. Individual safes in a burglar - proof and fire - proof vault. Largest and best safe deposit equipment in Ohio.

### The Cleveland Trust Company

121 EUCLID AVENUE, AT THE CORNER OF BOND STREET.



## Lucas' Questions and Answers For MARINE ENGINEERS.

This is a book for practical men—strictly up to date—of great assistance in preparing for examinations for a higher grade, as well as a work for every-day use.

The volume is strongly and durably bound in rich red cloth with full gilt edges, and titles in gold; it is  $7\frac{1}{2} \times 5$  inches,  $1\frac{1}{2}$  inches thick, and weighs nearly 2 lbs.; it is illustrated with 12 large plate engravings, 66 full, 83 half-page, and many other diagrams and illustrations; it has an index with more than 1,000 ready references.

### GENERAL OUTLINE OF CONTENTS.

Naturally the book divides itself into two parts—1, Construction ; 2, Operation; it contains 516 pages, and 807 Questions with carefully prepared answers, with nearly 300 explanatory foot notes.

The various types of marine steam-engine are fully explained, with description of the stationary parts (cylinders, bed plates, etc.) and moving parts (valves, gears, piston, piston-rod, etc.) and the operative details of a marine engine. Paddle Wheels and Screw Propellers, the auxiliary apparatus, piping and pipe connections are all taken up separately.

All types of steam boilers are described, with details of the construction of fire and water-tube boilers, operative details of marine boilers, fuel and fire-gases, combustion, and steam and its properties.

Five chapters are devoted to the Care and Operation of a Marine Engine, including lubricants and lubrication, packing and packing materials, care and overhauling in port, laying up a marine engine, and its care and operation under way. A chapter is devoted to Breakdowns and Repairs, as also one to Constructive Materials, and Tests of Strength; and in an Appendix Spare Parts and Tool Outfits are described.

**Price, \$2.00.** Sent post paid to any address. See order coupon. Money refunded if not satisfactory. Send for free catalog

SEND ALL ORDERS TO

**THEO. AUDEL & CO.**

ENGINEERING PUBLICATIONS,

63 Fifth Avenue,

New York City.

CUT OUT.  
ORDER COUPON.

Date.....

Enclosed find Two Dollars, for which send  
prepaid at once to the following address, one copy  
"Lucas' Questions and Answers  
for Marine Engineers."

Name.....

Address.....

CUT OUT.  
Marine  
Review.

**WATER  
FILTERS  
REGULATORS  
& ENGINES**

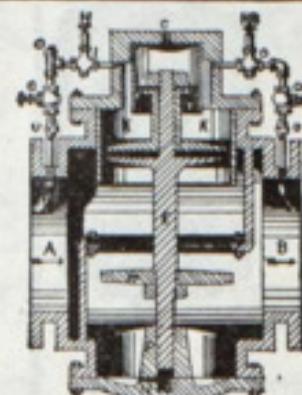
We make Pressure Regulating Valves for all purposes, steam or water.

Our Feed-Water Filter will keep oil out of your boiler.

We can interest you if you use a condenser.

Water Engines for Pumping Organs

**THE ROSS VALVE CO.** TROY N.Y.



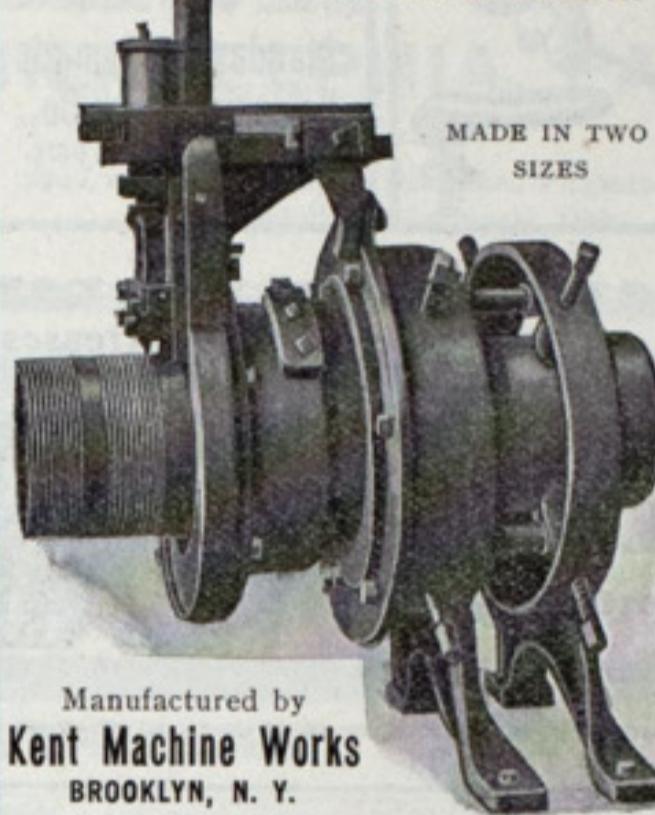
Water Works Regulating Valve  
Has no peer  
Ask for list of Water Works using our valves.

**IMPROVED  
MASON HAND LATHE**

For Cutting  
PIPE THREADS  
and NIPPLES

1 in. to 6 in. Diameter

MADE IN TWO  
SIZES



**A.J. MORSE & SON.**  
Diving Apparatus  
140 CONGRESS ST. BOSTON.

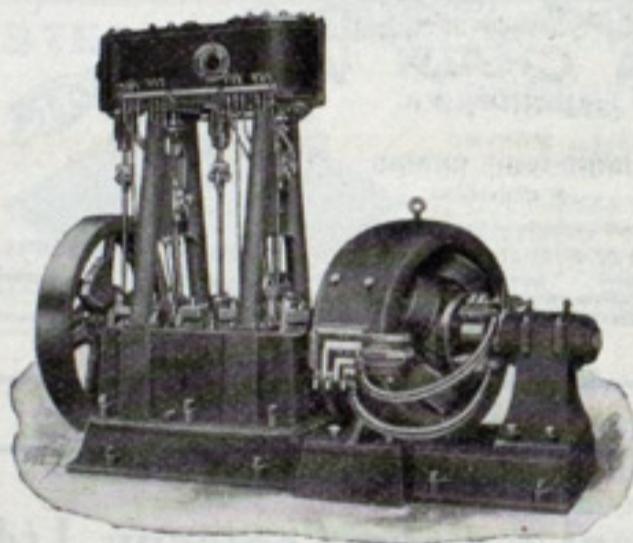
We offer an  
**Engine for Direct-Connected  
Electric Plants.**

which we can guarantee

to stand up under extreme changes from no load to full load, and to REGULATE TO PERFECTION.

That its construction is strong is self-evident.  
The shaft, rods, valve stems and other working parts are made of forged steel.

Every bearing is automatically lubricated.  
In finish it is all that can be desired.



WRITE FOR FULL PARTICULARS AND TESTS.

John E. Thropp & Sons' Co.  
TRENTON, N. J.

**ALFRED B. SANDS & SON**

MARINE PLUMBERS

AND MANUFACTURERS OF

Marine Plumbing Specialties



Marine Water Closet for either above or below water line.

Folding Lavatories, Ventilators, Pumps, Tanks, &c., &c.

134 BEEKMAN ST., New York.

**TIPPETT SAFETY VALVE**

GUARANTEED TO HAVE OVER TWICE THE RELIEVING CAPACITY OF ANY OTHER SAFETY VALVE

WRITE FOR CATALOGUE  
THE N. L. HAYDEN MFG. CO.  
COLUMBUS, OHIO, U. S. A.

**FAHEY & CO.**

BANKERS AND BROKERS,  
1011-1015 THE WILLIAMSON BLDG.  
TELEPHONE, MAIN 2754. CLEVELAND, O.

EVERY POSSIBLE FACILITY FOR  
CONDUCTING A BROKERAGE BUSINESS IN  
Stocks, Bonds, Grain, Etc.

Manufactured by  
Kent Machine Works  
BROOKLYN, N. Y.

**No Satisfaction  
Short of Perfection**

is the Principle underlying  
the Construction of the....

**S M I T H  
PREMIER  
Typewriter**

That is why Practical Improvements  
are first seen on the SMITH  
PREMIER. It is an up-with-the-times  
machine. ....  
::: Illustrated Catalogue Free ::::

**The Smith Premier  
Typewriter Co.**

158 Prospect St., Cleveland, O.

ORAM FIX. J. W. F.X.  
ESTABLISHED 1860.

**S. FIX'S SONS,**

Successors to S. FIX & SON,

**Steam Flue Welding Works**

Our Work Stands Government Test.  
Our Welds are Perfectly Smooth.  
Write us for Prices.

COR. LEONARD  
AND WINTER STS. Cleveland, O.

**Here's  
Your Steam**

but there's a lot lost  
before you get power into  
the cylinder. No matter  
how you use steam—  
power, heating, drying,  
cooking, any way—you  
need the "Heintz."

Postal for a copy of  
Booklet X 3—common  
sense for the busy mind.

WM. S. HAINES CO.,  
18th and Hamilton Sts.,  
Philadelphia, Pa.

**The Heintz Steam Trap**

A full stock of the new colored army  
charts, as well as all the latest hydro-  
graphic office charts and sailing directions,  
is kept on hand at all times by the

MARINE REVIEW PUB. CO.,  
39-41 WADE BUILDING, CLEVELAND.

Nothing but the latest charts, corrected  
up to date are sold.

**MACHINERY** New and Second  
Hand ENGINES,  
BOILERS, MA-  
CHINE TOOLS, CONTRACTORS' MACHINERY

**Geo. H. BOWLER & CO.**  
507-508 WILLIAMSON BUILDING, CLEVELAND, OHIO  
Warehouses 20-22 Frankfort St. 59-61 So. Water  
Street. Cleveland Terminal & Valley Railway.

**Standard Automatic Releasing Device.**

The Falls are so rove that both ends of the boat detach, irrespective of which end strikes the water first

Will release a boat immediately in the roughest sea or under speed and can be hooked on without delay or injury to the hands of men hooking it on.

**Standard Automatic Releasing Hook Co.**

New Cheesbrough Bldg.  
17 State St., New York.

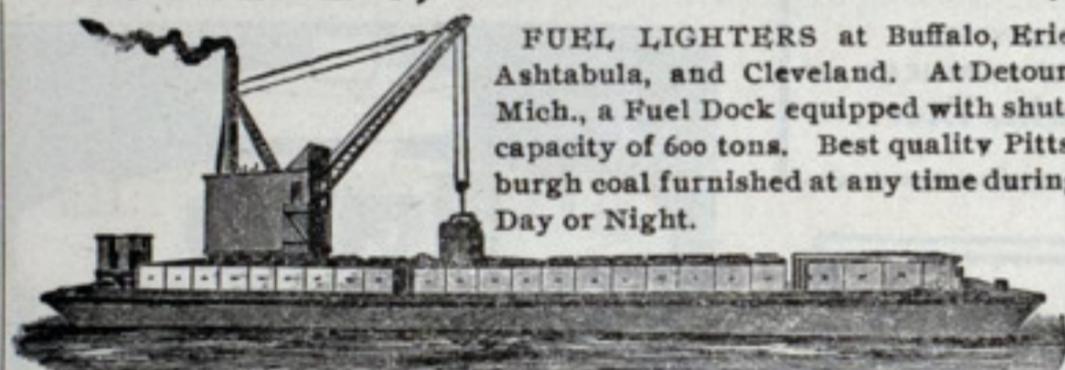
**Fogg's Resilient Felt Mattresses and Cushions.**

Manufactured By.

**M. W. FOGG,**

202 Front St. N. Y.

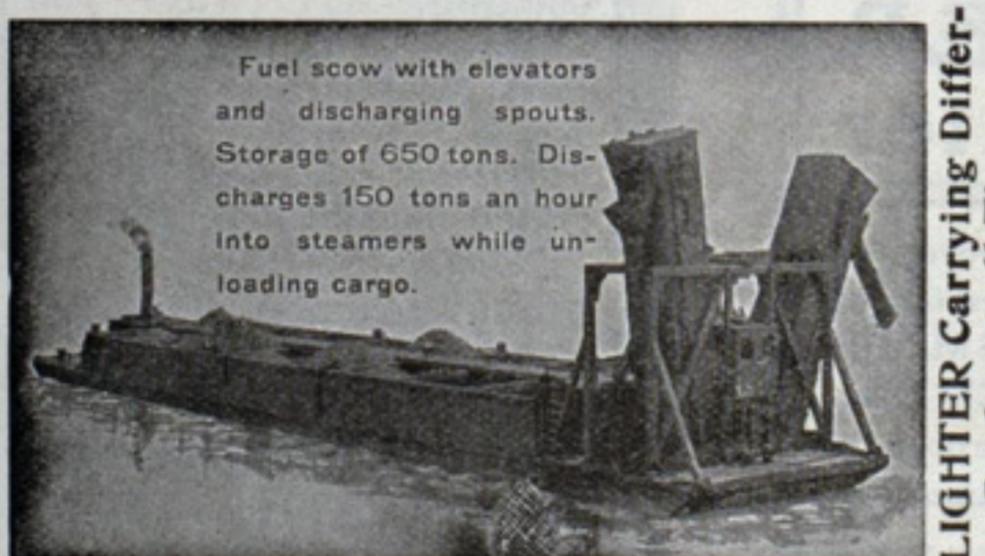
Send for Illustrated Catalogue.

**PICKANDS, MATHER & CO.,**

Western Reserve Building, CLEVELAND, O.

**Steamboat Fuel at Ashtabula.** Large Supplies of best Quality.

Fuel scow with elevators and discharging spouts. Storage of 650 tons. Discharges 150 tons an hour into steamers while unloading cargo.



LIGHTER Carrying Different Grades at all Times.

M. A. HANNA & CO. Miners and Shippers, Main Office Perry-Payne Bdg. Clevl d.



IRON OR STEEL FORGINGS FINISHED COMPLETE, ROUGH MACHINED OR SMOOTH FORGED ONLY, OF ANY WEIGHT. COUPLING LINKS AND PINS. PRESSED WROUGHT IRON TURNBUCKLES. CAR IRON SPECIALTIES.

**A TRUSCOTT BOAT.**

SIMPLE. SAFE. SPEEDY. RELIABLE.

It may be possible to build better and safer boats, but it hasn't been done yet. We send a completely illustrated catalogue and price list free, which tells you all about boats and why Truscott Boats Excel.

**TRUSCOTT BOAT MFG CO.** ST. JOSEPH, MICH.

**WARRINGTON IRON WORKS,**

Builders of STEAM YACHTS, TOW BOATS and LAUNCHES.

Marine Engines, Boilers and Tanks.

Heavy Machinery and Plate Iron Works.

Foot of West Wellington St.,

CHICAGO, ILLINOIS

**PATTERSON'S NAUTICAL ENCYCLOPEDIA.** PRICE, \$3.00

Is in all respects a work up to date, correct as to every term known to the shipping world. Sent upon approval. Carriage prepaid.

THE MARINE REVIEW PUB. CO.,

CLEVELAND.

**The Graham Coal & Coke Company, Ltd.**

1008-9 Chamber of Commerce

WHOLESALE

**COAL AND COKE**

Exceptional facilities for Supplying Vessels.

Steamboat fueling pockets at foot of 21st Street.

Detroit, Mich.

Dock Phone Mich. W 266

**SHEPARD'S HORSE POWER SCALE**

FOR DETERMINING

HORSE POWER,  
SIZE OF CYLINDERS,  
DENSITY, TEMPERATURE,  
LATENT HEAT OF STEAM.

Has sold in great numbers at \$1 each.

OFFERED AS A PREMIUM  
WITH ONE YEAR'S  
SUBSCRIPTION TO THE  
MARINE REVIEW  
AND MARINE RECORD  
AT \$3.00.

# CASTNER, CURRAN & BULLITT,

SOLE AGENTS FOR

**C. C. B. POCOHONTAS**SMOKELESS  
SEMI-BITUMINOUS**COAL**

THE BEST STEAM COAL IN THE WORLD.



Officially endorsed by Great Britain and United States. Standard Fuel of United States Navy. For ten years used exclusively on Cunard, White Star and other Transatlantic Lines.

**Main Office, Arcade Bldg., 1 S. 15th St., PHILADELPHIA, PA.**

## BRANCH OFFICES:

1 Broadway, New York.  
Citizens' Bank Building, Norfolk, Va.

Old Colony Building, Chicago, Ill.  
70 Kilby Street, Boston, Mass.  
4 Fenchurch Avenue, London, England.

Terry Building, Roanoke, Virginia.  
Neave Building, Cincinnati, Ohio.

# PITTSBURG COAL COMPANY.

Steamboat Fueling Facilities at Various Points on the Great Lakes:

CLEVELAND HARBOR { 4 Car Dumpers.  
{ 3 Lighters.FAIRPORT HARBOR { 1 Car Dumper.  
{ 1 Lighter.ASHTABULA HARBOR { 1 Car Dumper.  
{ 1 Lighter.ERIE HARBOR { 1 Car Dumper.  
{ Fuel Pockets.DETROIT RIVER BRANCH { Docks and Pockets at  
{ Sandwich and Amherstburg.SAULT RIVER BRANCHES { Dock and Pockets at Detour.  
{ Dock and Pockets at Sault Ste. Marie. (The Port Royal Dock Co.)WE FURNISH ONLY  
THE BEST GRADE OF**Pittsburg and Youghiogheny Coal.**

GENERAL OFFICE, LAKE DEPARTMENT, PERRY-PAYNE BUILDING, CLEVELAND, OHIO.

## STEAMBOAT FUEL AT CHICAGO. • • •



**Youghiogheny and  
Lehigh Coal Company.**  
J. T. CONNERY, ARCHIE J. HITCHCOCK,  
Manager Dock Sup't,  
Main Office: 902-906 Fisher Bldg.,  
277 DEARBORN STREET.

## FUEL DOCKS.

No. 1, Michigan Slip and Basin, - - - 'Phone Har. 4156.  
No. 2, North Halsted Street Bridge, - - - 'Phone Har. 4157.  
No. 3, Foot South Water St. and Illinois Central Slip C.  
'Phone Har. 4158.

## FUEL LIGHTER.

Equipped with 125 2-ton Buckets for Fueling Anywhere in Harbor.  
Long Distance Telephone, Har. 4156.

The Rochester & Pittsburgh Coal  
& Iron Co. — Steamboat Fuel Dock —  
Blackwell Canal at  
Michigan St. Bridge. 1400 feet of dock  
frontage. Hulett Car Dumping Ma-  
chine. Steam Fuel Scow of 550 tons  
capacity. Boats coaled day or night.  
Office: 684-88 Ellicott Sq. Buffalo, N. Y.  
Telephone, Seneca 1154.  
E. McQ. Duthie, Cargo and Fuel Agent.

REYNOLDSVILLE  
COAL.

# STANLEY B. SMITH & CO.

DETROIT, MICH.

**COAL**

TOLEDO, OHIO.

SMITH'S COAL DOCK  
DETROIT RIVER12 POCKETS  
PLATFORM  
LOW DOCK

TOLEDO HARBOR

2 LIGHTERS  
2 DERRICKS  
(REVOLVING)  
2 LOW DOCKS

SHIPPIERS OF COAL BY RAIL AND LAKE.

## A COMPLETE SET OF CHARTS OF THE GREAT LAKES

ELEVEN IN ALL.

(Edges bound with Tape to Pre-  
vent Tearing.)Sent to any Address, Carriage Prepaid, for \$5.45.  
THE MARINE REVIEW PUB. CO.,

39-41 WADE BUILDING,

CLEVELAND, OHIO.

## VESSEL AND INSURANCE AGENTS.

**T. R. McCARTHY,**

STEAMSHIP and FREIGHT BROKER.  
Chartering, Forwarding and General Commission Agent; and Broker for the Sale, Purchase and Construction of Steamers and Sailing Vessels.

Marine and Fire Insurance Effectuated.

Cable address: "MACARTHY, MONTREAL."  
(Watkins', Scott's, Lieber's and A. B. C. Codes used.)

Shipping Agent to THE ASBESTOS & ASBESTIC CO., Ltd., of Danville, Que.

6 St. Sacrement St. - - - - - Montreal, Can.  
Correspondence invited and Agencies solicited.

C. W. Elphicke.

H. B. Earhart.

**C. W ELPHICKE & CO.,**

## VESSEL AND INSURANCE AGENTS,

Rooms 9-11, No. 6 Sherman St., CHICAGO, ILL.  
Long Distance Telephone, Harrison 1194.

W. A. Hawgood.

Arthur H. Hawgood.

**W. A. HAWGOOD & CO.,**

## VESSEL and INSURANCE AGENTS.

220-221 Perry-Payne Bldg., - - - CLEVELAND, O.  
Long Distance Telephone, Main 2395.  
Residence Telephone, W. A. Hawgood, Doan 84-J.  
Residence Telephone, Arthur H. Hawgood, Doan 841-J.

John Mitchell. John F. Wedow. Alfred Mitchell.

**MITCHELL & CO.,**

## VESSEL and INSURANCE AGENTS,

508, 509 & 510 Perry-Payne Bldg.  
Office Telephone, M 767. Residence, John Mitchell,  
Doan, 341. John F. Wedow, Doan, 141-J.  
Alfred Mitchell, Doan, 218.

CLEVELAND, - - - - - OHIO.

C. L. Hutchinson.

W. H. McGean.

**HUTCHINSON & CO.,**

## VESSEL and INSURANCE AGENTS,

Office Telephone, Main 2453.  
Residence, C. L. Hutchinson, Ridge 345-L.  
Residence, W. H. McGean, East 1421-J.  
313-315 Perry-Payne Bldg., - - - CLEVELAND, O.

**W. C. RICHARDSON,**VESSEL OWNER and BROKER  
and  
MARINE INSURANCE AGENT,

420-421 Perry-Payne Bldg. - - - CLEVELAND, O.  
Office Telephone 338; Residence Telephone, 2938.

D. Sullivan.

F. J. Sullivan.

**D. SULLIVAN & CO.**

## VESSEL AGENTS,

## MARINE INSURANCE.

2-4 Sherman Street, - - - - - CHICAGO, ILL.  
Office Tel., Harrison 2847; Residence, Ashland 2483.

**R. J. DUNHAM,**

## VESSEL AGENT. MARINE INSURANCE.

214 Sherman Street, - - - - - CHICAGO, ILL.  
TELEPHONES:

Office, Harrison, 2630; Residence, Dearborn, 671.

John B. Hall.

Harry B. Root.

**HALL & ROOT,**

## VESSEL AGENTS.

21-22 Exchange Bldg., 202 Main Street,  
Telephone, Seneca, 892. BUFFALO, N. Y.

**W. W. BROWN.**

## Member Cleveland Stock Exchange.

Buys and Sells all Kinds of Vessel Property.  
1105-1106 Williamson Bldg., - - - CLEVELAND, O.

**JOHN J. BOLAND,**

## VESSEL and INSURANCE AGENT.

25-26 Exchange Building, 202 Main St.  
Telephone, Seneca, 115. BUFFALO, N. Y.

J. J. H. Brown. J. B. Rodgers. Edward Smith.

**BROWN & CO.,**

## VESSEL and INSURANCE AGENTS,

202 Main Street, - - - - - BUFFALO, N. Y.

## VESSEL AND INSURANCE AGENTS.

**D. T. HELM & CO.**

## VESSEL and INSURANCE AGENTS.

Telephones—Office, 263  
Res. 381-3.

DULUTH, - - - - - MINN.

**SAMUEL HOLMES,**

## STEAMSHIP OFFICES, Morris Building.

66-68 Broad St.,

For Selling, Chartering and Building  
all Classes Steam Vessels.

Steam Vessel Circulars.  
Weekly Freight Circulars. NEW YORK.

**RUFUS S. KING,**  
Commission Merchant and Broker

MARITIME BUILDING, 6-10 BRIDGE ST.,  
Near Battery Park, - - - - - NEW YORK.

Has the Largest List of Steamships and  
Sailing Vessels for Sale in America,  
Consequently Most Bargains.

Buying, Selling and Building of Steamships, Ships,  
Yachts, Tugs, Steam Lighters, Schooners,  
Barges, etc.

Expert on Valuation of Steam and Sailing Vessels.

CABLE ADDRESS, "RUFUS," WATKINS' CODE.  
TELEPHONE, 3404 BROAD.

**F. H. WEEKS,**

## MARINE BROKER,

Vessels Sold, Chartered, Built and Insured.  
Cable Address, WEEKSHIP, New York.

Telephone, 3275 Broad. 32 Broadway, New York.

Charles P. Notman. David H. E. Jones.

**JAMES W. ELWELL & CO.,**

Established 1830.

## SHIP BROKERS and STEAMSHIP AGENTS.

Sell and Charter all Classes of Vessels.

Agents for Cyprien Fabre & Cie. S. S. Line, Cie. Havraise Peninsulaire, and Northwestern S. S. Co.  
Battery Park Bldg., 21-24 State St. NEW YORK.

## PROCTORS IN ADMIRALTY.

**McPherson, Clark, Campbell & Jarvis,**

Barristers-at-Law, Attorneys, Proctors in Admiralty.  
(Trust and Guaranty Building)

16 King St. West, - - - TORONTO, CANADA.

## ADMIRALTY AND MINING.

Telegraphic Address, "Clapher-Toronto."  
(W. D. McPherson and J. M. Clark authors of  
"The Law of Mines in Canada.")

**RAY G. MacDONALD,**

Attorney-at-Law and Proctor in Admiralty.

Suite 618 New York Life Building,

Telephone, Central 723. CHICAGO, ILL.

**SHAW, WARREN, CADY & OAKES,**

## Attorneys-at-Law,

904 to 907 Union Trust Bldg.,

Telephone, 685. DETROIT, MICH.

**C. E. KREMER,**

Counsellor at Law and  
Proctor in Admiralty.

Suite 821-822 - - - New York Life Building.

CHICAGO - - ILL.

**H. H. BACON,**

Attorney and Counsellor at Law  
and Proctor in Admiralty.

## NOTARY PUBLIC WITH SEAL.

Rooms 25 and 26 City Bank Building,

319 Main Street, - - - - - BUFFALO, N. Y.

## PROCTOR IN ADMIRALTY.

**HARVEY L. BROWN,**

## PROCTOR IN ADMIRALTY.

35 White Building, - - - - - BUFFALO, N. Y.

**HOYT, DUSTIN & KELLEY,**

## LAWYERS AND PROCTORS IN ADMIRALTY.

Offices, 702 Western Reserve Building,  
CLEVELAND, - - - - - OHIO.

**White, Johnson, McCaslin & Cannon,**  
ATTORNEYS-AT-LAW and  
PROCTORS IN ADMIRALTY.**GOULDER, HOLDING & MASTEN,**  
LAW OFFICES,

Harvey D. Goulder, S. H. Holding, Frank S. Masten.

Perry-Payne Building, - - - - - CLEVELAND, O.

**ALBERT J. GILCHRIST,**

## PROCTOR IN ADMIRALTY.

604 Perry-Payne Building, - - - - - CLEVELAND, O.

O. C. Pinney.

Dorr E. Warner.

**PINNEY & WARNER,**

## LAWYERS AND PROCTORS IN ADMIRALTY.

Rooms 316 and 317 Perry-Payne Building.

Telephone, Main 2585 - - - - - CLEVELAND, O.

**H. R. SPENCER,**

## MARINE LAW,

## BOARD OF TRADE BUILDING,

DULUTH, - - - - - MINN.

## PROFESSIONAL.

**W. J. WOOD,**

## NAVAL ARCHITECT &amp; CONSULTING ENGINEER.

Prepares designs or working drawings and specifications for all classes of vessels and superintends construction and repairs. Surveys damaged property and estimates cost of repairs. Arbitrator and court expert.

Vessels designed—Twin S. S. Virginia, U. S. S. Frolic, formerly steam yacht Comanche, Twin S. S. North West and North Land, I. W. Nicholas, and many others, including Fire Boats, Tugs, Barges, etc.

Complete Plans Furnished For Steel Composite or Wooden Vessels.

700 Rialto Building - - - - - CHICAGO.  
Tel. Harrison 1020.

**R. L. NEWMAN,** Consulting Engineer,  
Naval Architect.

## SHIP AND YACHT BROKER.

Attention to development of designs and superintendence during construction. Vessels for carrying oil in bulk a specialty; also surveys on general repairs. Oil fuel systems for marine and land purposes developed under the patents of the International Oil Fuel Construction Company of New York.

817 Chesebrough Bldg., Bowling Green,  
NEW YORK.

**JOSEPH KIDD,**

Marine Architect and Surveyor. Consulting Ship Builder and Engineer.

Over thirty years' experience. Specifications, Designs and Estimates, Superintendence of Construction and Repairs. Damage and Other Surveys carefully attended to. Negotiations for the building, charter or sale of all kinds of vessels and machinery.

610 Board of Trade, - - - - - DULUTH, MINN.

**AMBROSE V. POWELL, M. Am. Soc. C.E.**

## CIVIL ENGINEER,

Designs and Constructs Dry Docks, Harbor Works, Docks and Plant for Handling Coal and Ore, Foundations.

Office, 1008 Chamber of Commerce, CHICAGO, ILL.

## PROFESSIONAL

Members Maritime Association Port of N. Y.  
**SADLER, PERKINS & FIELD**  
 Naval Architects and Engineers.  
 Chartering and Brokerage.  
 Maritime Building, New York.  
 NEW YORK. DETROIT.

## WALTER GOODENOUGH.

NAVAL ARCHITECT and  
MARINE ENGINEER.  
508 Battery Park Building, NEW YORK CITY.

## HORACE SEE,

CONSULTING ENGINEER  
and NAVAL ARCHITECT.  
No. 1 Broadway, NEW YORK.

## ROBERT LOGAN,

**Marine Architect, Mechanical  
Draughtsman, Consulting Engineer.**

Specifications and designs for all descriptions  
of Marine Vessels, Engines and Boilers,  
Superintends Construction and Re-  
pairs. Damage and other Sur-  
veys carefully attended to.

810 Western Reserve Bldg. CLEVELAND, O.

## EDWARD GASKIN,

## SHIP BUILDING EXPERT.

Plans and Specifications for Ships, Surveys and  
Estimates, superintendence, etc.  
Ellicott Square, - - - - - BUFFALO, N. Y.

## CHARLES D. MOSHER,

NAVAL ARCHITECT AND ENGINEER,  
No. 1 Broadway, NEW YORK.



THE FASTEST YACHTS IN THE WORLD.

Arrow, 45.06 miles per hr. Ellide, 40.2 miles per  
hr. Feissen, 31.6 miles per hr. Norwood, 30.5  
miles per hr. Presto, 31 miles per hr. Yankee  
Doodle, 29.5 miles.

The Mosher Patent Triple and Quadruple Expansion Engines and Water-tube Boilers. These boilers have been supplied for no less than eleven of the torpedo boats of the U. S. Navy, the U. S. Monitor, Florida and six torpedo boats for Russian government, besides for numerous other fast yachts and launches. Most powerful, lightest and compact boiler made.

## Pittsburgh Testing Laboratory, Ltd.,

INSPECTING AND METALLURGICAL  
ENGINEERS AND CHEMISTS,  
1750 Monadnock, 235 Water Street,  
CHICAGO. PITTSBURG,  
906-7 Crczier Building, Philadelphia,  
New York City, 60 New Street.  
Richmond, Va., 1107 1-2 Main St.  
Inspectors of Shipbuilding Materials and Machinery.  
Inspectors located at all mills. Physical and Chemical Laboratories. Tests of all kinds.

## ROBERT W. HUNT &amp; CO.

BUREAU OF INSPECTION.  
TESTS AND CONSULTATION.  
1121 The Rockery, Chicago.  
Monong. Bank Bldg., Pittsburg.  
71 Broadway, New York.  
Inspectors of Shipbuilding Material and Machinery.  
Inspectors of all Materials. Duty Tests of  
Engines and Boilers. Physical and  
Chemical Laboratories.

## PATENTS.

E. L. Thurston. **Albert H. Bates.**  
**THURSTON & BATES,**  
Counselors at Law in Patent Causes,  
and Solicitors of Patents.  
1028 Society for Savings Bldg., - CLEVELAND, O.

**SCHWENCKE, KIRK & CO.,**  
Importers and Manufacturers of  
DRAWING MATERIALS.

**26 Church St, NEW YORK,  
Factory, HOBOKEN, N. J.**

## Steamer for Sale.

Steamer T. D. Stimson for sale. Capacity 550,000 ft. lumber. Rates A-2; fully rebuilt two years ago. Will take smaller steamer part payment. Address A. B. Slyfield, owner, Port Huron, Mich. Mar. 5.

## Schooner for Sale.

Schooner Helvetia for sale. Capacity 1,000,000 ft. of lumber or 1,500 tons of ore. Price \$12,000. Inquire of H. J. Johnson, 1015 Society for Savings Cleveland, O. Feb. 26.

Passenger Steamer and Tug  
for Sale.

Steamer Ogantz, 80 ft. keel, 18 ft. 8 in. beam, 7 ft. 6 in. draught. Fore and aft compound engine, 14 and 25 by 16 in. Scotch boiler, 10 ft. by 84 in., allowed 125 lbs. steam. Passenger allowance—45 regular and 190 excursion.

Tug Dan Connelley, 65 ft. keel, 16 ft. 6 in. beam. 8 ft. 6 in. draught. Iron boiler 13½ ft. by 76 in., allowed 90 lbs. steam. Double engine, 14x15 in.

These boats were in commission last season and are in good condition. Price reasonable. For particulars address The Sandusky Fish Co., Sandusky, O. tf

## Schooner for Sale.

Schooner carrying 150 M. ft. of lumber or 90 cords of maple wood. Will be sold cheap for cash. For full particulars, address Box 37, Marine Review Pub. Co., Cleveland, O. tf

## Steamer for Sale.

For Sale.—Steamer City of Grand Rapids. In good condition and will sell at a bargain. For particulars address Barry Trans. Co., Chicago, Ill. Mar. 5.

## Steamer for Sale Cheap.

Light draught steamer C. W. Liken, 79 ft. over all, 18 ft. beam. Engines, 12 ft. square. In good condition. For further particulars address A. Wheeler, Bay City, Mich. Mar. 5.

## Tug For Sale

Tug Norris.—47 ft. long, 12 ft. beam, draught only 4 ft. Hull thoroughly rebuilt last winter. Boiler 44 in. diameter by 7 ft. high. Allowed 150 lbs. pressure. Engine 8x8. Boiler and engine nearly new and in first class condition. Speed 9 miles per hour. Plenty of deck room. Write for further particulars Hardy & Dischinger, Toledo, Ohio. Mar. 5.

## Passenger Steamer For Sale

Light draught passenger steamer Juliet 70 ft. keel, 17 ft. beam. Twin screw. Gross tonnage 61, net tonnage 44. Fine canopied deck. Cabin fitted up luxuriously. Pullman berths. Excellent arrangements for cooking. Apply to Thomas A. Smyth, Room 1103 Security Building, Chicago, Ill. Mar. 12.

## Barge Wanted.

Wanted to buy tow barge that will carry 500 M. to 600 M. ft. of lumber. Canadian register preferred. Address Canada, care Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland, O. Feb. 26.

## Tug Wanted.

Wanted to purchase tug about 75 to 80 ft. long, 18 to 20 ft. beam, and 9 to 11 ft. depth; compound engine; good power. Address Powell & Mitchell, Marquette, Mich. tf.

## Steamer Wanted.

Wanted—to buy or lease steamer for ferry service at Duluth ship canal. Should accommodate from 300 to 600 passengers. Write and send photograph to Inter State Traction Co., Duluth, Minn. tf.

## Almy Boiler For Sale.

One Cass D. boiler of Almy type, rated 62 H. P., having 15½ sq. ft. of grate surface and 600 ft. of heating surface. Dimensions; 58½ in. wide, 58½ in. long, and 81 in. high. Complete trycock, check valve, blow-off valve and consolidated safety valve. This boiler tested with 600 lbs. hydrostatic pressure; working pressure 330 lbs.; insured at this pressure. For further information and price address, Box 38, Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland O. Mar. 1

## Boiler and Engine For Sale.

Both in first-class condition. Boiler 10½ ft. in diameter and 14 ft. long; 120 lbs. steam allowed. Fore and aft compound engine; high-pressure, 22 in. diameter low-pressure, 44 in., with 36 in. stroke. Address Barry Trans. Co., East End Michigan St., Chicago, Ill. Mar. 12

## Schooner for Sale.

For Sale.—Schooner Bertha Barnes. Capacity 425 M. ft. of lumber. For particulars apply to James A. Myers, Royal Insurance Bldg., or L. Sargisson, 905 St. Louis Ave., Chicago. tf

## Steamer For Sale.

For sale at a bargain, steamer Cambria, a Canadian boat, 206 ft. long and 40 ft. beam, fitted with feather dip paddles, electric lighting plant; fully equipped with all sailing appliances; used for both passenger and freight purposes. Will sell for \$3,000.00 Address, Frank Lenahan & Son, 53 Fulton St., Buffalo, N. Y. tf

## Two Tugs For Sale.

Tug John Johnson—Engine 20½x22; boiler allowed 120 lbs. steam. Tug Warwick—Engine 15 by 17; boiler allowed 110 lbs. steam. Both boats, engines and boilers practically new and in first-class condition. Boats can be seen at Toledo any time. Cheap for cash. Enquire of James Rooney, 1118 Collingwood Ave., Toledo, O. tf

## For Sale.

Steamer Aztec and schooner Miztec. Carrying capacity—Aztec 1,100 tons ore, Miztec 1,500 tons ore. Laid up at Toledo, O. Address C. H. Burchinal, 210 Valentine Bldg., Toledo, O. Mar 8

FOR SALE.  
STEAMBOAT ENGINES.

Two pair 7 x 9 double cylinder vertical reversible **steam engines** of the Crane elevator engine style. Send for blue print, photos and price. Also **pumps, condensers** and **small engines for electric lights**.

**CLYDE MACHINE WORKS**  
33d St. and Shields Ave. - Chicago, Ill.

## BUYERS' DIRECTORY OF THE MARINE TRADE.

For a more complete classification than that represented by advertisers in the Marine Review and Marine Record, see the BLUE BOOK OF AMERICAN SHIPPING, marine and naval directory of the United States, published by the Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland.

See accompanying index of Advertisers for full addresses of concerns in this directory.

<b>AIR COMPRESSORS, AIR HOISTS, ETC.</b>	Warrington Iron Works.....Chicago. Willard, Chas. P. & Co.....Chicago.	<b>CORRESPONDENCE SCHOOLS.</b>
Chicago Pneumatic Tool Co.....Chicago. "Long Arm" System Co.....Cleveland.		Chicago Nautical School.....Chicago.
<b>AIR PUMPS AND APPLIANCES.</b>	<b>BOILER COMPOUNDS.</b>	<b>CHAIN CONVEYORS, HOISTS.</b>
Fore River Ship & Engine Co.....Quincy, Mass.	Dearborn Drug & Chemical Works.....Chicago.	Bartlett & Snow Co., C. O.....Cleveland. Brown Hoisting Machinery Co., (Inc.)...Cleveland. Chicago Pneumatic Tool Co. ....Chicago. General Electric Co. ....Schenectady, N. Y. Lidgerwood Mfg. Co.....New York. Railway Appliances Co.....Chicago. Westinghouse Electric & Mfg. Co. ....Pittsburg.
<b>ANCHORS.</b>	<b>BOILER COVERING.</b>	<b>DEAD-LIGHTS, AIR-PORTS, ETC.</b>
Baldt Anchor Co.....Chester, Pa. Bowers, L. M. & Co. ....Binghamton, N. Y. DeGrauw, Aymar & Co. ....New York Seaboard Steel Casting Co.....Chester, Pa.	Johns-Manville Co., H. W.....New York.	"Long-Arm" System Co. ....Cleveland.
<b>ANTI-FRICTION METALS.</b>	<b>BOILER RIVETS.</b>	<b>DIPPER TOOTH FOR DREDGES AND STEAM EXCAVATORS.</b>
Cramp, Wm. & Sons.....Philadelphia. Hardy, Wm. A.....Fitchburg, Mass. Phosphor Bronze Smelting Co., Ltd....Philadelphia. Pittsburg White Metal Co. ....Pittsburg, Pa.	Bourne-Fuller Co.....Cleveland. <b>BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.</b>	Pryor Patent Excavator Tooth Co. ....Houghton, Mich.
<b>ARTIFICIAL DRAFT FOR BOILERS.</b>	Falls Hollow Staybolt Co. ....Cuyahoga Falls, O.	<b>DOORS, WATER TIGHT, ETC.</b>
American Ship Building Co.....Cleveland. Bloomsburg & Co., H.....Newport News, Va. Buffalo Forge Co.....Buffalo. Detroit Shipbuilding Co.....Detroit. Sturtevant, B. F. Co. ....Boston.	<b>BRASS AND BRONZE CASTINGS.</b>	Long Arm System Co. ....Cleveland.
<b>ASBESTOS.</b>	Cramp, Wm. & Sons .....Philadelphia. Fore River Ship & Engine Co. ....Quincy, Mass. Macbeth Iron Co. ....Cleveland. Phosphor Bronze Smelting Co. ....Philadelphia.	<b>DRAWING MATERIALS.</b>
Johns-Manville Co., H. W.....New York.	<b>BRASS—SHEET, ROD, ETC.</b>	Schwencke, Kirk & Co.....New York.
<b>ATTORNEYS AND PROCTORS IN ADMIRALTY.</b>	Waterbury Brass C .....New York.	<b>DIVING APPARATUS.</b>
Bacon, H. H.....Buffalo. Brown, Harvey L.....Buffalo. Gilechrist, Albert J.....Cleveland. Goulder, Holding & Masten.....Cleveland. Hoyt, Dustin & Kelley.....Cleveland. Kremer, C. E. ....Chicago. MacDonald, Ray G.....Chicago. McPherson, Clark, Campbell & Jarvis....Toronto. Pinney & Warner.....Cleveland. Shaw, Warren, Cady & Oakes.....Detroit. Spencer, H. R. ....Duluth. White, Johnson, McCaslin & Cannon....Cleveland.	<b>BRASS WORK, MARINE.</b>	Morse, A. J. & Son.....Boston. Schrader's Son, A. ....New York.
<b>BANKERS.</b>	Farnan Brass Works .....Cleveland.	<b>DRILL PRESSES—DRILLS OF ALL KINDS.</b>
Fahey & Co.....Cleveland. Federal Trust Co. ....Cleveland. Cleveland Trust Co. ....Cleveland.	<b>BRIDGES, BUILDERS OF</b>	Cleveland Punch & Shear Works Co. ....Cleveland. Railway Appliances Co. ....Chicago.
<b>BAROMETERS, MARINE GLASSES, ETC.</b>	Scherzer Rolling Lift Bridge Co. ....Chicago.	<b>DRYING APPARATUS.</b>
Bliss, John & Co.....New York. Ritchie, E. S. & Sons.....Brookline, Mass.	<b>BUCKETS, ORE AND COAL.</b>	Buffalo Forge Co. ....Buffalo. Sturtevant, B. F. Co. ....Boston.
<b>BELTING, RUBBER.</b>	Bartlett & Snow Co., C. O. ....Cleveland. Brown Holisting & Conveying Machine Co. ....Cleveland. Lake Erie Boiler Works.....Cleveland. Webster, Camp & Lane Co. ....Akron, O.	<b>DRY DOCKS.</b>
New York Belting & Packing Co. ....New York.	<b>CABIN AND CABINET FINISHING WOODS.</b>	American Ship Building Co. ....Cleveland. Atlantic Works .....East Boston, Mass. Baltimore Ship Building Dry Dock Co. ....Baltimore. Bath Iron Works, Ltd. ....Bath, Me. Buffalo Dry Dock Co. ....Buffalo. Chicago Ship Building Co. ....Chicago. Craig Ship Building Co. ....Toledo, O. Cramp, Wm. & Sons .....Philadelphia. Detroit Ship Building Co. ....Detroit. Harlan & Hollingsworth Co. ....Wilmington, Del. Lockwood Mfg. Co. ....East Boston, Mass. Manitowoc Dry Dock Co. ....Manitowoc, Wis. Marine Construction & Dry Dock Co. ....New York. Maryland Steel Co. ....Sparrow's Point, Md. Milwaukee Dry Dock Co. ....Milwaukee. Moran Bros. Co. ....Seattle, Wash. Newport News Ship Building Co. ....Newport News, Va. Nixon, Lewis .....Elizabeth, N. J. Pusey & Jones Co. ....Wilmington, Del. Shipowners Dry Dock Co. ....Chicago. Superior Ship Building Co. ....Superior, Wis.
<b>BLOCKS, SHEAVES, ETC.</b>	Martin-Barriss Co. ....Cleveland.	<b>ELECTRIC HOISTS AND CRANES.</b>
Boston & Lockport Block Co. ....Boston, Mass. Cleveland Block Co. ....Cleveland.	<b>CAPSTANS.</b>	Elwell-Parker Electric Co. ....Cleveland. General Electric Co. ....Schenectady, N. Y. Seidler-Miner Electric Co. ....Detroit. United Marine Mfg. & Supply Co. ....New York. Westinghouse Electric & Mfg. Co. ....Pittsburg, Pa.
<b>BLOWERS.</b>	American Ship Windlass Co. ....Providence, R. I. Hyde Windlass Co. ....Bath, Me.	<b>ELECTRIC FIXTURES AND APPLIANCES.</b>
Buffalo Forge Co. ....Buffalo. Sturtevant, B. F. Co. ....Boston.	<b>CAST IRON PIPE.</b>	General Electric Co. ....Schenectady, N. Y. Seidler-Miner Electric Co. ....Detroit. United Marine Mfg. & Supply Co. ....New York. Westinghouse Electric & Mfg. Co. ....Pittsburg, Pa.
<b>BOAT BUILDERS.</b>	Wood & Co., R. D. ....Philadelphia.	<b>ELECTRIC LIGHT AND POWER PLANTS.</b>
Drein, Thos. & Son.....Wilmington, Del. Kahnweller's Sons, David.....New York. Lane & DeGroot.....Long Island City, N. Y. Marine Construction & D. D. Co., .... .....Mariner's Harbor, S. I., N. Y. Marine Iron Works.....Chicago. Truscott Boat Mfg. Co. ....St. Joseph, Mich. Warrington Iron Works.....Chicago. Willard, Chas. P. & Co. ....Chicago.	<b>CEMENT, IRON, FOR REPAIRING LEAKS.</b>	Buffalo Forge Co. ....Buffalo. Electro-Dynamic Co. ....Philadelphia. Elwell-Parker Electric Co. ....Cleveland. General Electric Co. ....Schenectady, N. Y. Seidler-Miner Electric Co. ....Detroit. Sturtevant, B. F. Co. ....Boston. United Marine Mfg. & Supply Co. ....New York. Westinghouse Electric & Mfg. Co. ....Pittsburg, Pa.
<b>BOILER MANUFACTURERS.</b>	Smooth-On Mfg. Co. ....Jersey City, N. J.	<b>ELECTRIC STEERING GEAR, SPEED AND RUDDER INDICATORS, ETC.</b>
Almy Water Tube Boiler Co. ....Providence, R. I. American Ship Building Co. ....Cleveland. Atlantic Works.....East Boston, Mass. Babcock & Wilcox Co. ....New York. Bath Iron Works, Ltd. ....Bath, Me. Boyer's Sons, L. ....New York. Chicago Ship Building Co. ....Chicago. Clyde Machine Works.....Chicago. Cramp, Wm. & Sons.....Philadelphia. Dearing Water Tube Boiler Co. ....Detroit. Delauney Belleville & Co. ....St. Denis, France. Detroit Shipbuilding Co. ....Detroit. Fletcher, W. & A. Co. ....Hoboken, N. J. Fore River Ship & Engine Co. ....Quincy, Mass. Harlan & Hollingsworth Co. ....Wilmington, Del. Jenks Ship Building Co. ....Port Huron, Mich. Kingsford Foundry & Machine Works. ....Oswego, N. Y. Lake Erie Boiler Works.....Cleveland. MacKinnon Mfg. Co. ....Bay City, Mich. Maryland Steel Co. ....Sparrow's Point, Md. Milwaukee Dry Dock Co. ....Milwaukee. Moran Bros. Co. ....Seattle, Wash. Mosher, Chas. D. ....New York. Neafie & Levy Ship & Engine Building Co. ....Philadelphia. Newport News Ship Building Co. ....Newport News, Va. Nixon, Lewis .....Elizabeth, N. J. Pusey & Jones Co. ....Wilmington, Del. Risdon Iron Works .....San Francisco. Roberts Safety Water Tube Boiler Co. ....New York. Stirling, The Co. ....Chicago. Superior Ship Building Co. ....Superior, Wis. Taylor Water Tube Boiler Co. ....Detroit. Trigg, Wm. R. Co. ....Richmond, Va. Union Machine & Boiler Co. ....Cleveland.	With Steam Heating Attachment.	Electro-Dynamic Co. ....Philadelphia.
<b>COAL PRODUCERS AND SHIPPERS.</b>	Boston & Lockport Block Co. ....Boston, Mass. Dake Engine Co. ....Grand Haven, Mich.	<b>ENGINE BUILDERS, MARINE.</b>
Castner, Curran & Bullitt .....Boston. Graham Coal & Coke Co., Ltd. ....Detroit. Hanna, M. A. & Co. ....Cleveland. Pickands, Mather & Co. ....Cleveland. Pittsburg Coal Co. ....Cleveland. Rochester & Pittsburg Coal & Iron Co. ....Buffalo.	<b>CHARTS.</b>	American Ship Building Co. ....Cleveland. Atlantic Works .....East Boston, Mass. Bath Iron Works, Ltd. ....Bath, Me. Bell Engineering Works, David .....Buffalo. Buffalo Forge Co. ....Buffalo. Chicago Ship Building Co. ....Chicago. Chase Machine Co. ....Cleveland. Craig Ship Building Co. ....Toledo, O. Cramp, Wm. & Sons .....Philadelphia. Dake Engine Co. ....Grand Haven, Mich. Detroit Ship Building Co. ....Detroit. Fletcher, W. & A. Co. ....Hoboken, N. J. Fore River Ship & Engine Co. ....Quincy, Mass. Great Lakes Engineering Works. ....Detroit, Mich. Hall Bros. ....Philadelphia. Harlan & Hollingsworth Co. ....Wilmington, Del. Jenks Ship Building Co. ....Port Huron, Mich. Lockwood Mfg. Co. ....East Boston, Mass. MacKinnon Mfg. Co. ....Bay City, Mich. Maryland Steel Co. ....Sparrow's Point, Md. Milwaukee Dry Dock Co. ....Milwaukee. Moran Bros. Co. ....Seattle, Wash. Mosher, Chas. D. ....New York. Neafie & Levy Ship & Engine Bldg. Co. ....Philadelphia. Newport News Ship Building Co. ....Newport News, Va. Nixon, Lewis .....Elizabeth, N. J. Pusey & Jones Co. ....Wilmington, Del. Risdon Iron Works .....San Francisco. Roach's Ship Yard .....Chester, Pa. Thropp, J. E. & Sons Co. ....Trenton, N. J. Sheriffs Mfg. Co. ....Milwaukee. Superior Ship Building Co. ....Superior, Wis. Trigg, Wm. R. Co. ....Richmond, Va. Trout, H. G. ....Buffalo. Warrington Iron Works .....Chicago. Willard, Chas. P. & Co. ....Chicago.
<b>COAL AND ORE HANDLING MACHINERY.</b>	Bartlett & Snow Co., C. O. ....Cleveland. Brown Holisting Machinery Co., (Inc.)...Cleveland. Lidgerwood Mfg. Co. ....New York. Webster, Camp & Lane Co. ....Akron, O.	<b>COMPASSES.</b>
Bartlett & Snow Co., C. O. ....Cleveland. Brown Holisting Machinery Co., (Inc.)...Cleveland. Lidgerwood Mfg. Co. ....New York. Webster, Camp & Lane Co. ....Akron, O.	Bliss, John & Co. ....New York. Ritchie, E. S. & Sons.....Brookline, Mass.	Bliss, John & Co. ....New York. Ritchie, E. S. & Sons.....Brookline, Mass.
<b>CONDENSER TUBE PACKING.</b>	Allen, Joseph .....Collingswood, N. J.	<b>CONDENSER TUBE PACKING.</b>
Allen, Joseph .....Collingswood, N. J.	Lake Erie Boiler Works.....Cleveland. McCutcheon, C. H. ....Buffalo. Topky Brothers .....Ashtabula, O.	Allen, Joseph .....Collingswood, N. J.
<b>COPPER, TIN AND SHEET IRON WORK.</b>	Waterbury Brass Co. ....New York.	<b>COPPER—SHEET, TUBES AND ROD.</b>
Lake Erie Boiler Works.....Cleveland. McCutcheon, C. H. ....Buffalo. Topky Brothers .....Ashtabula, O.	Waterbury Brass Co. ....New York.	Baker & Co., H. H. ....Buffalo. DeGrauw, Aymar & Co. ....New York. Upson-Walton Co. ....Cleveland.
<b>COPPER—SHEET, TUBES AND ROD.</b>		<b>CORDAGE.</b>
Waterbury Brass Co. ....New York.		Baker & Co., H. H. ....Buffalo. DeGrauw, Aymar & Co. ....New York. Upson-Walton Co. ....Cleveland.
<b>CORK JACKETS AND RINGS.</b>		<b>CORDAGE.</b>
Armstrong Cork Co. ....Pittsburg, Pa. Kahnweller's Sons, D. ....New York. Lane & DeGroot .....Long Island City, N. Y.		Baker & Co., H. H. ....Buffalo. DeGrauw, Aymar & Co. ....New York. Upson-Walton Co. ....Cleveland.

## BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

## ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.

Cory, Chas. & Son ..... New York.  
 Electro-Dynamic Co. ..... Philadelphia.  
 MacLean Hydraulic Signal Co. ..... Chicago.  
 Seldler-Miner Electric Co. ..... Detroit.

## ENGINEERING BOOKS.

Audel & Co., Theo. ..... New York.  
 Marine Review Pub. Co. ..... Cleveland.

## ENGINEERING SPECIALTIES AND SUPPLIES.

Crane Co. ..... Chicago.  
 Farnan Brass Works ..... Cleveland.  
 Kieley & Mueller ..... New York.  
 McCutcheon, C. H. ..... Buffalo.  
 New York Belting & Packing Co. ..... New York.  
 Reilly Repair & Supply Co., James ..... New York.

ENGINEERS, MARINE, MECHANICAL,  
CONSULTING.

Electro-Dynamic Co. ..... Philadelphia.  
 Garrett-Cromwell Engineering Co. ..... Cleveland.  
 Gaskin, Edward ..... Buffalo.  
 Goodenough, Walter ..... New York.  
 Hunt, Robt. W. & Co. ..... Chicago.  
 Kidd, Joseph ..... Duluth, Minn.  
 Logan, Robert ..... Cleveland.  
 Mosher, Chas D. ..... New York.  
 Newman, R. L. ..... New York.  
 Pittsburgh Testing Laboratory, Ltd. ..... Pittsburgh.  
 Powell, Ambrose V. ..... Chicago.  
 Roelker, H. B. ..... New York.  
 Sadler, Perkins & Field. ..... New York.  
 See, Horace ..... New York.  
 Wood, W. J. ..... Chicago.

## EVAPORATING AND DISTILLING APPARATUS.

Reilly Repair & Supply Co., James ..... New York.

## FANS FOR VENTILATION, EXHAUST, ETC.

Buffalo Forge Co. ..... Buffalo.  
 Sturtevant, B. F. Co. ..... Boston.

## FEED WATER PURIFIERS AND HEATERS.

Learmonth, Robert ..... Buffalo.  
 Reilly Repair & Supply Co., James ..... New York.  
 Ross Valve Co. ..... Troy, N. Y.

## FIXTURES FOR LAMPS, OIL AND ELECTRIC.

General Electric Co. ..... Schenectady, N. Y.  
 Seldler-Miner Electric Co. ..... Detroit.  
 Westinghouse Electric & Mfg. Co. ..... Pittsburgh, Pa.

## FORGES.

Buffalo Forge Co. ..... Buffalo.  
 Sturtevant, B. F. Co. ..... Boston.

FORGINGS FOR CRANK, PROPELLER OR  
THRUST SHAFTS, ETC.

Cleveland City Forge & Iron Co. ..... Cleveland.  
 Fore River Ship & Engine Co. ..... Quincy, Mass.  
 Macbeth Iron Co. ..... Cleveland.

## FLUE WELDING.

Fix's, S. Sons ..... Cleveland.

## FURNACES FOR BOILERS.

Continental Iron Works ..... New York.

## FUELING COMPANIES AND COAL DEALERS.

Castner, Curran & Bullitt (Pocahontas) ..... Phila.  
 Graham Coal & Coke Co., Ltd. ..... Detroit.  
 Hanna, M. A. & Co. ..... Cleveland.  
 Pickands, Mather & Co. ..... Cleveland.  
 Pittsburgh Coal Co. ..... Cleveland.  
 Rochester & Pittsburgh Coal & Iron Co. ..... Buffalo.  
 Smith, Stanley B. & Co. ..... Detroit.  
 Youghiogheny & Lehigh Valley Coal Co. ..... Chicago.

## GASKETS, RUBBER.

New York Belting & Packing Co. ..... New York.

## GAS BUOYS.

Safety Car Heating & Lighting Co. ..... New York.

## GAS AND GASOLINE ENGINES.

Chase Machine Co. ..... Cleveland.

## GAGES, STEAM AND VACUUM.

American Steam Gauge Co. ..... Boston.  
 Ashton Valve Co. ..... Boston.

## GRAPHITE.

Dixon Crucible Co., Joseph ..... Jersey City, N. J.

## HAMMERS, STEAM.

Bell Engineering Works, David ..... Buffalo.  
 Chase Machine Co. ..... Cleveland.  
 Railway Appliances Co. ..... Chicago.

## HARDWARE, SHIP.

Topky Brothers ..... Ashtabula, O.

## HATCH GEARS.

"Long-Arm" System Co. ..... Cleveland.

## HEATING APPARATUS.

Buffalo Forge Co. ..... Buffalo.  
 Sturtevant, B. F. Co. ..... Boston.

## HOISTS FOR CARGO, ETC.

American Ship Building Co. ..... Cleveland.  
 Brown Hoisting Machinery Co., Inc. ..... Cleveland.  
 Chase Machine Co. ..... Cleveland.  
 Elwell-Parker Electric Co. ..... Cleveland.  
 General Electric Co. ..... New York.  
 Hyde Windlass Co. ..... Bath, Me.  
 Lidgerwood Mfg. Co. ..... New York.  
 Marine Iron Co. ..... Bay City.  
 Westinghouse Electric & Mfg. Co. ..... Pittsburgh, Pa.

## HOLLOW STAYBOLT IRON.

Falls Hollow Staybolt Co. ..... Cuyahoga Falls, O.

## HOSE FITTINGS.

Farnan Brass Works ..... Cleveland.

## HOSE, RUBBER.

New York Belting & Packing Co. ..... New York.

## HYDRAULIC MACHINERY.

Watson-Stillman Co., The ..... New York.

## ICE MACHINERY.

American Linde Refrigerating Co. ..... New York.

## INDICATORS FOR STEAM ENGINES.

American Steam Gauge Co. ..... Boston.

## INJECTORS.

American Injector Co. ..... Detroit.

## INSTRUMENTS.

Crane Co. ..... Chicago.

## INSURANCE, MARINE.

Jenkins Bros. ..... New York.

Lunkenheimer Co. ..... Cincinnati.

Penberthy Injector Co. ..... Detroit, Mich.

## IRON ORE AND PIG IRON.

Brown & Co. ..... Buffalo.

## IRON WORKS.

Brown, W. W. ..... Cleveland.

## IRONORE.

Dunham, R. J. ..... Chicago.

## IRONWORKS.

Elphicke, C. W. & Co. ..... Chicago.

## IRONWORKERS.

Hawgood & Co., W. A. ..... Cleveland.

## IRONWORKERS.

Helm & Co., D. T. ..... Duluth.

## IRONWORKERS.

Hutchinson & Co. ..... Cleveland.

## IRONWORKERS.

Insurance Co. of North America ..... Philadelphia.

## IRONWORKERS.

McCarthy, T. R. ..... Montreal.

## IRONWORKERS.

McCurdy, Geo. L. ..... Chicago.

## IRONWORKERS.

Mitchell & Co. ..... Cleveland.

## IRONWORKERS.

Peck, Chas. E. & W. F. ..... New York and Chicago.

## IRONWORKERS.

Richardson, W. C. ..... Cleveland.

## IRONWORKERS.

Sullivan, D. & Co. ..... Chicago.

## IRONWORKERS.

Weeks, F. H. ..... New York.

## IRONWORKERS.

## BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

## PROPELLER WHEELS.

American Ship Building Co.	Cleveland
Atlantic Works	East Boston, Mass.
Baltimore Ship Building & Dry Dock Co.	Baltimore
Bath Iron Works, Ltd.	Bath, Me.
Cramp, Wm. & Sons	Philadelphia
Detroit Ship Building Co.	Detroit
Fore River Ship & Engine Co.	Quincy, Mass.
Great Lakes Engineering Works	Detroit
Harlan & Hollingsworth Co.	Wilmington, Del.
Jenks Ship Building Co.	Port Huron, Mich.
Lockwood Mfg. Co.	East Boston, Mass.
Manitowoc Dry Dock Co.	Manitowoc, Wis.
Marine Construction & Dry Dock Co.	
Mariner's Harbor, S. I., N. Y.	
Maryland Steel Co.	Sparrow's Point, Md.
Milwaukee Dry Dock Co.	Milwaukee
Moran Bros. Co.	Seattle, Wash.
Neafle & Levy Ship & Engine Bldg. Co.	Phila.
Newport News Ship Bldg. Co.	Newport News, Va.
Nixon, Lewis	Elizabeth, N. J.
Pusey & Jones Co.	Wilmington, Del.
Risdon Iron Works	San Francisco
Roelker, H. B.	New York
Sheriffs Mfg. Co.	Milwaukee
Superior Ship Building Co.	Superior, Wis.
Thropp & Sons Co., J. E.	Trenton, N. J.
Trigg, Wm. R. Co.	Richmond, Va.
Trout, H. G.	Buffalo

## PROJECTORS, ELECTRIC.

Elwell-Parker Electric Co.	Cleveland
General Electric Co.	Schenectady, N. Y.
Seidler-Miner Electric Co.	Detroit
Westinghouse Electric & Mfg. Co.	Pittsburg, Pa.

## PUMPS FOR VARIOUS PURPOSES.

Blake, Geo. F. Mfg. Co.	New York
Clyde Machine Works	Chicago
Great Lakes Engineering Works	Detroit
Kingsford Foundry & Machine Wks.	Oswego, N. Y.
Long Arm System Co.	Cleveland

## PUNCHES, RIVETERS, SHEARS.

Chicago Pneumatic Tool Co.	Chicago
----------------------------	---------

## REFRIGERATING APPARATUS.

Roelker, H. B.	New York
----------------	----------

## REGISTER FOR CLASSIFICATION OF VESSELS.

Great Lakes Register	Cleveland
Record of American & Foreign Shipping	New York

## RELEASING HOOKS FOR DETACHING BOATS.

Standard Automatic Releasing Hook Co.	New York
---------------------------------------	----------

## RIVETS, STEEL, FOR SHIPS AND BOILERS.

Bourne-Fuller Co.	Cleveland
-------------------	-----------

## RANGES.

Russell & Watson	Buffalo
------------------	---------

## RIVETS—BRASS AND COPPER.

Waterbury Brass Co.	New York
---------------------	----------

## RUBBER INSULATED WIRES.

Roebling's Sons, Jno. A.	New York and Cleveland
--------------------------	------------------------

## SAFETY VALVES.

American Steam Gauge Co.	Boston
Ashton Valve Co.	Boston
Hayden Mfg. Co., N. L.	Columbus, O.
Lunkenheimer Co.	Cincinnati

## SAIL MAKERS.

Baker, Howard H. & Co.	Buffalo
Upson-Walton Co.	Cleveland
Wilson & Silsby	Boston

## SALVAGE COMPANIES.

See Wrecking Companies.	
-------------------------	--

## SCHOOLS—NAUTICAL, ENGINEERING.

Chicago Nautical School	Chicago
-------------------------	---------

## SEARCH LIGHTS.

Elwell-Parker Electric Co.	Cleveland
General Electric Co.	Schenectady, N. Y.
Seidler-Miner Electric Co.	Detroit
Westinghouse Electric & Mfg. Co.	Pittsburg, Pa.

## SHEARS.

See Punches, Rivets, and Shears.	
----------------------------------	--

## SHIP AND BOILER PLATES AND SHAPES.

Bourne-Fuller Co.	Cleveland
-------------------	-----------

## SHIP BUILDERS.

American Ship Building Co.	Cleveland
Atlantic Works	East Boston, Mass.
Baltimore Ship Building & Dry Dock Co.	Baltimore
Bath Iron Works, Ltd.	Bath, Me.
Bell Engineering Works, David	Buffalo
Buffalo Dry Dock Co.	Buffalo
Cramp, Wm. & Sons	Philadelphia

Craig Ship Building Co.	Toledo, O.
Chicago Ship Building Co.	Chicago
Detroit Ship Building Co.	Detroit
Fore River Ship & Engine Co.	Quincy, Mass.
Great Lakes Engineering Works	Detroit
Harlan & Hollingsworth Co.	Wilmington, Del.
Jenks Ship Building Co.	Port Huron, Mich.
Lockwood Mfg. Co.	East Boston, Mass.
Manitowoc Dry Dock Co.	Manitowoc, Wis.
Marine Construction & Dry Dock Co.	
Mariner's Harbor, S. I., N. Y.	
Maryland Steel Co.	Sparrow's Point, Md.
Milwaukee Dry Dock Co.	Milwaukee
Moran Bros. Co.	Seattle, Wash.
Neafle & Levy Ship & Engine Bldg. Co.	Phila.
Newport News Ship Bldg. Co.	Newport News, Va.
Nixon, Lewis	Elizabeth, N. J.
Pusey & Jones Co.	Wilmington, Del.
Risdon Iron Works	San Francisco
Roach's Ship Yard	Chester, Pa.
Smith & Son, Abram	Algonac, Mich.
Trigg, Wm. R. Co.	Richmond, Va.
Warrington Iron Works	Chicago
Willard, Chas. P. & Co.	Chicago

## SHIP CHANDLERS.

Baker, Howard H. & Co.	Buffalo
Moran Bros. Co.	Seattle, Wash.
Reilly Repair & Supply Co., James	New York
Upson-Walton Co.	Cleveland

## SHIP LANTERNS AND LAMPS.

Helvig, H. A. J.	New York
Page Bros. & Co.	New York
Russell & Watson	Buffalo

## SMOOTH-ON COMPOUND, FOR REPAIRS.

Smooth-On Mfg. Co.	Jersey City, N. J.
--------------------	--------------------

## SPARS—LARGE SIZES.

Moran Bros. Co.	Seattle, Wash.
-----------------	----------------

## STAYBOLTS, IRON OR STEEL, HOLLOW, OR SOLID.

Falls Hollow Staybolt Co.	Cuyahoga Falls, O.
---------------------------	--------------------

## STEAM VESSELS FOR SALE.

Elwell, Jas. W. & Co.	New York
Holmes, Samuel	New York
King, Rufus S.	New York
McCarthy, T. R.	Montreal, Can.
Newman, R. L.	New York
Weeks, F. H.	New York

</

## ALPHABETICAL INDEX OF ADVERTISERS IN THE MARINE REVIEW AND MARINE RECORD.

The star (\*) indicates that the advertisement appears alternate weeks. For addresses see advertisements on pages noted.

*Allen, John F. ....	11	Delaware River Iron S. B. & E. Works. ....	5	Lake Erie Boiler Works. ....	14	*Reilly Repair & Supply Co., Jas. 9
Allen, Joseph ....	3	Detroit Ship Building Co. ....	1	Lane & DeGroot ....	4	Risdon Iron Works ..... 5
Almy Water Tube Boiler Co. ....	15	Dixon Crucible Co., Joseph. ....	12	*Learmonth, Robert ....	3	*Ritchie & Sons, E. S. .... 13
American Injector Co. ....	10	Donnelly Salvage & Wrecking Co. ....	7	Lebanon Chain Works. ....	38	Roach's Ship Yard ..... 5
American Line ....	13	Drein, Thos. & Son. ....	4	Lidgerwood Mfg. Co. ....	6	Roberts Water Tube Boiler Co. .... 15
American Metallic Packing Co. ....	11	Dunham, R. J. ....	40	Lockwood Mfg. Co. ....	4	Rochester & Pittsburg Coal & Iron Co. .... 39
American Ship Building Co. ....	1	Electro-Dynamic Co. ....	1	Logan, Robert ....	41	*Roebling's, John A. Sons Co. .... 48
American Ship Masters Ass'n. ....	6	Elphicke, C. W. & Co. ....	40	"Long-Arm" System Co. ....	1	Roelker, H. B. .... 5
American Ship Windlass Co. ....	2	Elwell, Jas. W. & Co. ....	40	L. S. & M. S. Ry. ....	45	Ross Valve Co. .... 37
American Steam Gauge Co. ....	1	Elwell-Parker Electric Co. ....	2	Lunkenheimer Co. ....	12	Russell & Watson .... 6
*American Steam Packing Co. ....	25	Erie & Western Trans Co. ....	45	McCarthy, T. R. ....	40	Sadler, Perkins & Field. .... 41
Anchor Line ....	45	Fahey & Co. ....	37	McCurdy, Geo. L. ....	7	Safety Car Heating & Lighting Co. .... 3
Armstrong Cork Co. ....	48	Falls Hollow Staybolt Co. ....	4	McCutcheon, C. H. ....	11	Sands, Alfred B. & Son. .... 37
Ashton Valve Co. ....	16	Farnan Brass Works. ....	12	McPherson, Clark, Campbell & Jarvis. ....	40	Scherzer Rolling Lift Bridge Co. .... 9
Atlantic Works ....	5	Fix's S. Sons. ....	37	Macbeth Iron Co. ....	48	Schrader's Sons, A. .... 1
*Atlantic Works, Inc. ....	11	Fletcher, W. & A. Co. ....	5	MacDonald, Ray G. ....	40	Schwencke, Kirk & Co. .... 41
Audel & Co., Theo. ....	36	Fogg, M. W. ....	38	MacKinnon Mfg. Co. ....	8	Seaboard Steel Casting Co. .... 33
Babcock & Wilcox Co. ....	15	Fore River Ship & Engine Co. ....	5	MacLean Hydraulic Signal Co. ....	6	See, Horace .... 41
Bacon, H. H. ....	40	Garrett-Cromwell Engineering Co. ....	3	Manitowoc Dry Dock Co. ....	31	Seidler-Miner Electric Co. .... 6
Baldt Anchor Line ....	9	Gaskin, Edward ....	41	Marine Construction & Dry Dock Co. ....	4	Shaw, Warren, Cady & Oakes. .... 40
Baltimore Ship Building & Dry Dock Co. ....	4	General Electric Co. ....	16	*Marine Iron Co. ....	4	Sheriffs Mfg. Co. .... 8
Baker, Howard H. & Co. ....	48	Gilchrist, Albert J. ....	40	Martin-Barriss Co. ....	9	Shipowners Dry Dock Co. .... 16
Bartlett & Snow Co., C. O. ....	2	Goodenough, Walter ....	41	Maryland Steel Co. ....	5	Smith & Son, Abram. .... 8
Bath Iron Works, Ltd. ....	1	Goulder, Fielding & Masten. ....	40	Midland Towing & Wrecking Co., Ltd. ....	48	Smith Premier Typewriter Co. .... 37
Bell, David, Engineering Works. ....	11	Graham Coal & Coke Co. ....	38	Milwaukee Dry Dock Co. ....	46	Smith, Stanley B. & Co. .... 39
Benedict & Burnham Mfg. Co. ....	16	Great Lakes Engineering Works. ....	34	Mitchell & Co. ....	40	Smooth-On Mfg. Co. .... 8
Bertram's Oil Polish Co. ....	1	Great Lakes Register. ....	7	Mohawk Paint & Chemical Co. ....	7	Spencer, H. R. .... 40
Berry Brothers, Ltd. ....	10	Haines Co., Wm. S. ....	37	*Moran Bros. Co. ....	47	Standard Chain Co. .... 4
Blake, Geo. F., Mfg. Co. ....	9	Hall Bros. ....	8	Morse & Son, A. J. ....	37	*Standard Oil Co. .... 14
*Bliss, John & Co. ....	13	Hall & Root. ....	40	Mosher, Chas. D. ....	41	Standard Releasing Hook Co. .... 38
*Bloomsburg & Co., H. ....	9	Hanna, M. A. & Co. ....	38	*Mott, J. L., Iron Works. ....	13	Stirling Co. .... 15
Boland, J. J. ....	40	Hardy, Wm. A. ....	14	National Tube Co. ....	14	Stratford Oakum Co., Geo. .... 6
*Boston & Lockport Block Co. ....	48	Harlan & Hollingsworth Co., The. ....	5	Neafie & Levy Co. ....	5	Sturtevant, B. F. Co. .... 48
Bourne-Fuller Co. ....	16	Hawgood & Co., W. A. ....	40	Newman, R. L. ....	40	Sullivan & Co. .... 40
Bowers, L. M. & Co. ....	9	Hayden Mfg. Co., N. L. ....	37	Newport News Ship Building & Dry Dock Co. ....	5	Superior Ship Building Co. .... 46
Bowler & Co., Geo. H. ....	37	Helm & Co., D. T. ....	40	New Jersey Zinc Co. ....	7	Taylor Water Tube Boiler Co. .... 15
*Boyer's, L. Sons. ....	13	Helvig, H. A. J. ....	4	New York Belting & Packing Co. ....	10	Thropp, J. E. & Sons Co. .... 37
Brown, Harvey L. ....	40	Herriman, F. D. ....	7	Nicholson Ship Log Co. ....	3	Thurston & Bates. .... 41
Brown & Co. ....	40	Holmes, Samuel ....	40	Nixon, Lewis ....	5	*Topky Bros. .... 12
Brown Holsting Machinery Co., Inc. ....	2	Hoyt, Dustin & Kelley ....	41	North River Iron Works. ....	4	Trigg Co., Wm. R. .... 5
Brown, W. W. ....	40	Hunt, Robert W. & Co. ....	41	Peck, Chas. E. & W. F. ....	7	Trout, H. G. .... 8
Buffalo Dry Dock Co. ....	46	Hutchinson & Co. ....	40	Penberthy Injector Co. ....	10	Truscott Boat Mfg. Co. .... 38
Buffalo Forge Co. ....	16	Hyde Windlass Co. ....	48	Pere Marquette R. R. & S. S. Line. ....	45	Union Machine & Boiler Co. .... 8
Castner, Curran & Bullitt. ....	39	Insurance Co. of North America. ....	7	Phosphor Bronze Smelting Co. Ltd. ....	14	United Marine Mfg. & Supply Co. .... 31
Chase Machine Co. ....	8	International Navigation Co. ....	13	Pickands, Mather & Co. ....	40	Upson-Walton Co. .... 48
*Chelsea Clock Co. ....	3	Jenkins Brothers. ....	3-12	Pinney & Warner ....	40	U. S. Metallic Packing Co. .... 48
Chicago & N. W. Ry. ....	45	Jenks Ship Building Co. ....	47	Pittsburg Coal Co. ....	39	Walker, Thomas & Son. .... 3
Chicago Nautical School ....	12	Johns-Manville Co., H. W. ....	31	Pittsburg Testing Laboratory, Ltd. ....	41	Ward Machine Co. .... 47
Chicago Pneumatic Tool Co. ....	16	Kahnweller's Sons, David. ....	4	Pittsburg White Metal Co. ....	33	Warrington Iron Works. .... 38
Chicago Ship Building Co. ....	46	Katzenstein, L. & Co. ....	3	Potter, J. D. ....	3	Watson-Stillman Co. .... 47
Cleveland City Forge & Iron Co. ....	38	Kent Machine Works. ....	37	Powell, Ambrose V. ....	40	Webster, Camp & Lane Co. .... 2
Cleveland Trust Co. ....	36	Kidd, Joseph ....	40	Pryor Patent Excavator Tooth Co. ....	9	Weeks, F. H. .... 40
Continental Iron Works ....	2	Kiley & Mueller. ....	3	Pusey & Jones Co. ....	5	Westinghouse Electric & Mfg. Co. .... 16
Cory, Chas. & Son ....	12	Kingsford Foundry & Machine Works. ....	13	Queen City Engineering Co. ....	12	White, Johnson, McCaslin & Can- non. .... 40
*Craig Ship Building Co. ....	13	King, Rufus S. ....	40	Railway Appliances Co. ....	33	*Willard, Chas. P. & Co. .... 13
Cramp, Wm. & Sons, S. & E. B. Co. ....	1	Kremer, C. E. ....	40	Record of American & Foreign Shipping. ....	6	Wood, W. J. .... 40
*Crandall & Son, H. I. ....	11			Red Star Line. ....	13	Youghiogheny & Lehigh Coal Co. .... 39
Crane Co. ....	4-7			Richardson, W. C. ....	40	
Dake Engine Co. ....	12					
Dearborn Drug & Chemical Wks. ....	13					
Dearing Water-Tube Boiler Co. ....	32					
DeGrauw, Aymar & Co. ....	9					
Delauney, Belleville & Co. ....	32					

### PERE MARQUETTE R.R. & STEAMSHIP LINE

Chicago, Milwaukee, Manitowoc,  
and Grand Rapids, Saginaw,  
Port Huron, Detroit, Toledo

H. F. MOELLER, Gen'l Passenger Agent  
Send for folder. DETROIT, MICH.

### The Erie & West. Transportation Co.

ANCHOR LINE.

#### PASSENGER SERVICE Steamers.

India.	China.	Japan.
<b>PORTS OF CALL.</b>		
Buffalo.	Erie.	Cleveland.
Detroit.		Mackinac Island.
Sault Ste. Marie.	Marquette.	Houghton.
Hancock.	Duluth.	

#### FREIGHT SERVICE Steamers.

Alaska.	Codorus.	Mahoning.
Schuylkill.	Conestoga.	Clarion.
Delaware.	Juniata.	Lehigh.
Lycoming.	Susquehanna.	Wissahickon.
Conemaugh.		

#### PORTS OF CALL.

Buffalo.	Erie.	Cleveland.
Detroit.	Sault Ste. Marie.	Marquette.
Houghton.	Hancock.	Duluth.
W. Superior	Chicago.	Milwaukee.

CHAS. E. MARKHAM, E. T. EVANS,  
General Passenger Agent, Western Manager,  
Buffalo, N. Y.

### LAKE SHORE & MICHIGAN SOUTHERN RY.

Eastward.  
No. 18, Southwestern Lim.  
No. 22, Lake Shore Lim....  
No. 20, Chi & Cleve Ex....  
No. 28, N Y & Bost Ex....  
No. 40, Toledo & Buff Ac....  
No. 32, Fast Mail....  
No. 44, Ac via Sandusky....  
No. 46, Southwestern Ex....  
No. 106, Conneaut Accom....  
No. 6, Lim Fast Mail....  
No. 26, 20th Cent L. m....  
No. 10, C. N Y & B Sp....  
No. 16, New Eng Ex....  
No. 2, Day Express....  
No. 126, Norwalk Accom....

Arrive  
from  
West  
Depart  
East.  
\*2:15am \*2:20am  
\*7:20am .....  
\*7:40am \*8:00am  
10:00am \*10:40am  
\*11:25am \*11:30am  
11:40pm .....  
..... \*3:00pm  
..... \*4:30pm  
\*5:40pm \*5:45pm  
\*7:40pm \*7:43pm  
\*7:30pm \*7:50pm  
\*10:30pm \*10:35pm  
19:10pm 19 25pm  
\*7:50am .....

Westward.  
No. 11, Southwestern Lim.  
No. 7, Day Express....  
No. 15, Bost & Chi Sp....  
No. 19, Lake Shore Lim....  
No. 23, Western Express....  
No. 33, Southern Express....  
No. 133, Cleve & Det Ex....  
No. 47, Accommodation....  
No. 141, Sandusky Accom....  
No. 43, Fast Mail....  
No. 127, Norwalk Accom....  
No. 37, Pacific Express....  
No. 3, Fast Mail Lim....  
No. 115, Conneaut Accom....

Arrive  
from  
West  
Depart  
East.  
\*3:25am .....  
..... 16:10am  
\*3:10am \*3:15am  
\*7:15am \*7:20 m  
\*

WILLIAM L. BROWN, President.

B. W. WELLS, Vice-Pres.

O. R. SINCLAIR, Sec'y &amp; Treas.

ALFRED G. SMITH, Gen'l Supt.

# CHICAGO SHIP BUILDING COMPANY,

**Steel Ship Builders and  
Dry Dock Proprietors.**

Dry Dock and Yards: 101st St. and Calumet River,

CHICAGO, ILL.

## MILWAUKEE DRY DOCK COMPANY

MILWAUKEE, WISCONSIN

### SHIP REPAIRS

OF ALL KINDS

Two Ship Yards offer every Facility for the  
Repair of both Steel and Wooden Vessels

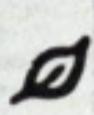
#### South Yard Dock....

is 450 ft. long on keel blocks; 460 feet over all;  
56 feet width of gate, and 16 feet over sill.

#### West Yard Dock....

312 feet on keel blocks; 45 feet width of gate,  
and 12 feet over sill.

Rudder Pit in Each Dock.  
Electric Lights for Night Work.

Main  
Office at

**SOUTH YARD,**  
Foot of Washington St.

EDWARD SMITH, President.

WILLIAM KNIGHT, Asst. Sec'y &amp; Treas.

W. T. NEVINS, Superintendent.

## THE BUFFALO DRY DOCK CO.

GANSON STREET AND BUFFALO RIVER.

Operating Four Docks, Sixty-ton Shear Legs, and in every way Equipped

WITH MODERN PLANT FOR

The Building and Economical Repairs of

### STEEL AND WOODEN SHIPS

LONG DISTANCE TELEPHONE CONNECTIONS:

Office Telephone, 515 Seneca.

President's Telephone, 279 Seneca, Office.

President's Telephone, 209 Bryant, Residence.

Asst. Sec'y &amp; Treas., Telephone, 609 Bryant, Residence.

Superintendent, Telephone, 108 South, Residence.

## THE SUPERIOR SHIPBUILDING COMPANY

Dry Dock  
and Repairs  
of All Kinds

SHIP AND  
ENGINE  
BUILDERS

Two Largest  
Dry Docks  
On the Lakes

Large Stock of Material Always on Hand for Repairing Wooden and Metal Ships.

Repairing Promptly Attended  
to, Night or Day.

West Superior, Wis.

# The Jenks Ship Building Co.

## STEEL SHIP BUILDERS,

### MARINE ENGINES AND BOILERS.

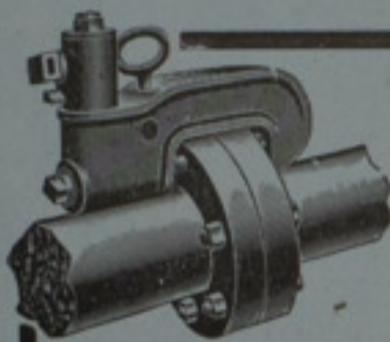
Prompt Attention Given to Repairs of all Kinds on Ships, Engines and Boilers.

OFFICE AND MACHINE SHOPS  
AT FOURTH STREET.

YARDS AT FOOT OF LINCOLN  
AVENUE.

PORT HURON,

MICHIGAN.



all our Jacks  
are "Cracker-Jacks"

The first HYDRAULIC JACK we ever made WAS the best ever made—that was over 50 years ago.

We now build over 250 kinds—if the one you want is not among them we will make one to suit.

We build our Jacks with rams and cylinders made from a solid high carbon steel—no so called seamless drawn tubing—no welds—forced joints or by pass holes to cut packing.

We have catalogues of Hydraulic Jacks, Punches and Valves and Benders. We will be glad to send you one or all.



WATSON - STILLMAN CO.

453 Rookery  
CHICAGO.

203-14 E. 43d St.  
NEW YORK CITY.



### SOME MEN PAY

\$10,000 for an expert to manage their advertising.

There are others who pay \$5.00 for an annual subscription to PRINTERS' INK and learn what all the other advertisers are thinking about, but even these are not the extremes reached.

There are men who lose over \$100,000 a year by doing neither one.

FOR SAMPLE COPY SEND 10 CENTS TO

PRINTERS' INK,  
No. 10 Spruce St., NEW YORK CITY.

### WARD MACHINE COMPANY

GENERAL MACHINISTS

C. E. WARD, Mgr.

MARINE WORK A SPECIALTY.

19 Michigan St.

Cleveland, O.

### PHOTOGRAPHS OF DOCKS, ETC.

We can furnish photographs of lake docks, elevators, coal and ore handling machinery, etc., at very low prices.

MARINE REVIEW PUB. CO.,

39-41 Wade Bldg.,  
CLEVELAND, O.

### STEEL SHIPS.

THEIR CONSTRUCTION AND MAINTENANCE.

A manual for ship builders, ship superintendents, students and marine engineers.

By Thomas Walton.

Price \$5.50. THE MARINE REVIEW PUB. CO., Cleveland.

THE ONLY

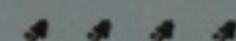
MARINE DIRECTORY  
BLUE BOOK

—OF—

AMERICAN SHIPPING

NOW IN ITS SEVENTH YEAR.

1902 EDITION JUST FROM THE PRESS.



Every ship builder, marine engine and boiler builder, ship owner, naval architect, marine engineer, and, in fact, everyone in the United States whose business is with ships is mentioned in the Blue Book and his address given. The aim has been to make it a complete working directory of the marine trade of the United States. With its aid you may reach anyone connected with this great branch of industry.

Its statistics of waterborne commerce are thoroughly reliable. The section devoted to the commerce of the great lakes with its iron mines and their output, its coal trade and dock facilities, its grain trade and elevators, its ships and their owners, is very thorough and absolutely authentic.



MARINE REVIEW PUB. CO.

39-40-41 WADE BLDG., CLEVELAND, O.

PROPELLER WHEELS

AETNA GRATE BARS,  
TIMBERHEADS, CHOCKS, ETC.

**MACBETH IRON CO.**  
CLEVELAND, OHIO

**THE MACBETH  
IRON CO.**  
57 WEST CENTER ST.

ENGINEERS, FOUNDERS AND  
MACHINISTS.  
HEAVY FORGINGS  
ENGINE REPAIRS.



141

## U. S. METALLIC PACKING CO.,

422 North 13th St.,  
PHILADELPHIA, PA.

Our Packing is in use on 700  
Steam Vessels in all parts of the  
world. It is a packing that can be  
depended upon. • • • •

### NEW METAL

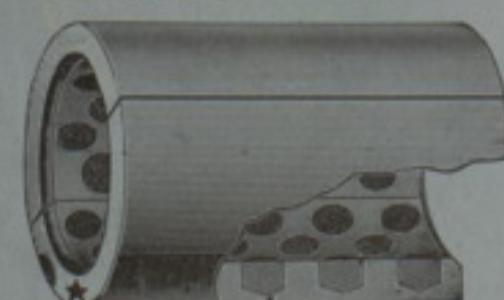
#### Cargo Hoisters

Wrought Iron Hook and Strap,  
Galvanized Iron Shelves and  
Sheaves. Sheaves fitted with  
Genuine Star Metaline Bushings  
with Metaline Side Bearings.

These Blocks Save the Rope and  
Outwear all others.



STAR METALINE  
BUSHING.



Send for 1902 Catalogue M. A. R.  
—FREE.

MANUFACTURED ONLY BY

Boston & Lockport Block Co., BOSTON MASS.  
LOCKPORT, N.Y.

Midland Towing and Wrecking Co., Ltd.  
MIDLAND, ONT., CANADA.

State of Ohio, } SS.  
County of Cuyahoga, }

**Good Rope vs. Cheap Rope.**

TRIAL NOW ON.

**Jurors: All Vessel Men.**

**THE UPSON-WALTON CO.**

Are on the side of Good Rope.

What will be your Verdict! • • • •

THE MOST COMPLETE STOCK

**BRASS and COPPER**

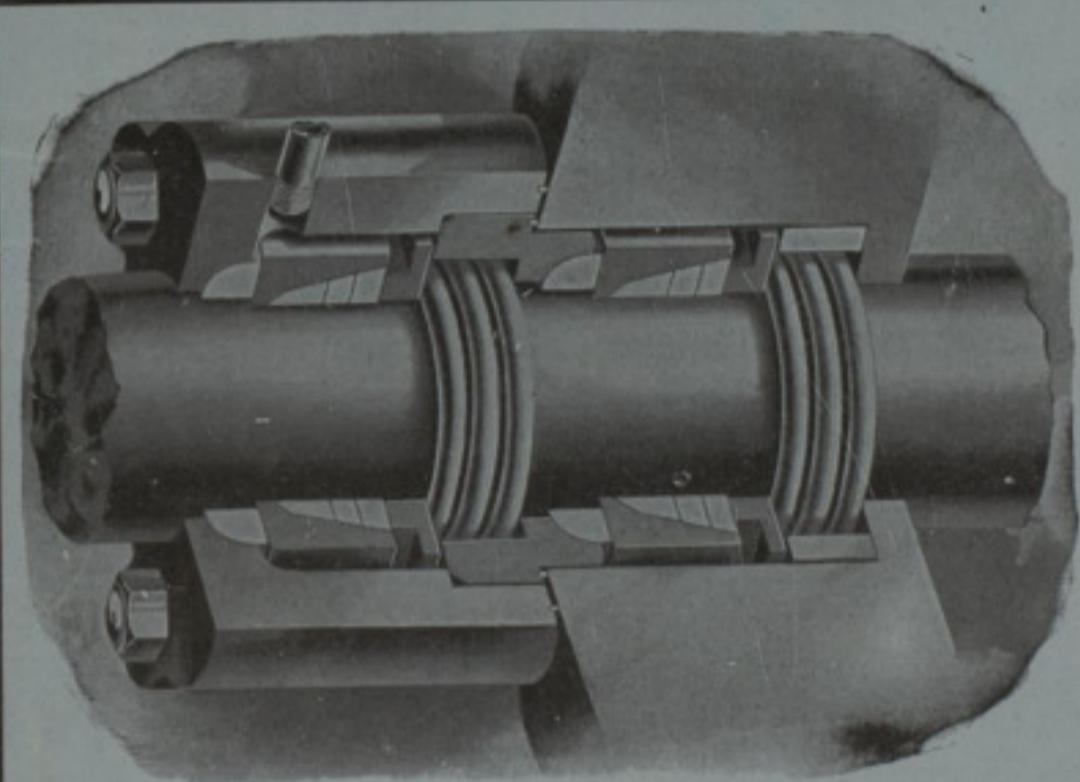
\* in Sheets, Tubes, Wire and Rod. \*

Service Right, Quality Right, Prices Right

**Waterbury Brass Co.**

122 to 130 Centre St., :: :: :: New York City

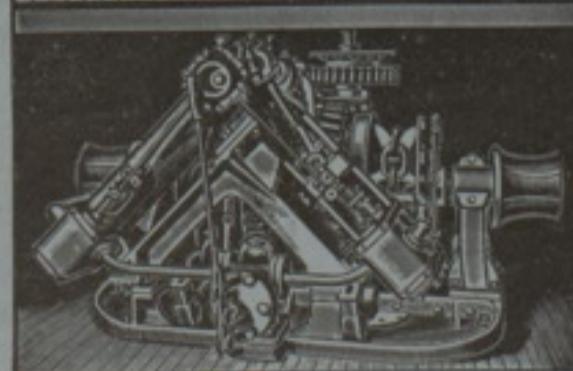
Always have our classified Stock List before you  
\*\*\* YOURS FOR THE ASKING \*\*\*



### WINDLASSES AND CAPSTANS



The Hyde Steam and  
Power Windlasses and  
Capstans are the best  
in the market.



They have been selected  
for most of the vessels now  
building for the Navy De-  
partment, Revenue Ma-  
rine, Light-house Board  
and United States  
Coast Survey.

THE "HYDE" STEAM CAPSTAN WINDLASS.

HYDE WINDLASS COMPANY,

BATH MAINE.

### LIFE PRESERVERS—BUOYS.

Acme. Solid Cork. Granulated Cork. Each Preserver stamped by U. S. In-  
spector guaranteeing proper buoyancy. Cork Filled Yacht Fenders. Cork  
Mooring Buoys. Material and Finish Guaranteed. Orders filled promptly.

ARMSTRONG CORK COMPANY.

Boston. New York. Philadelphia. Pittsburg. Chicago.

St. Louis. Baltimore.

JAMES PLAYFAIR, { Pres't and  
Gen. Mngr.  
D. L. WHITE, Vice-President.  
J. W. BENSON, Sec'y and Treas.

First-Class Tugs for Wrecking, Raft  
Towing, Etc. Steam Pumps, Divers,  
Jacks, Hawsers, Lighters. \* \* \*

18 to 26 TERRACE,  
**UPSON-WALTON CO., BUFFALO, N. Y.**

**Howard H. Baker & Co., SHIP CHANDLERS AND SAIL MAKERS,**

# MARINE REVIEW

WEEKLY.] AND MARINE RECORD.

[ESTABLISHED, 1878.

VOL. XXVII.

CLEVELAND, O., FEB. 26, 1903.

No. 9.



Established 1844.  
**A. SCHRADER'S SON,**  
32 Rose Street, NEW YORK.  
Manufacturer of  
Submarine Armor and Diving Apparatus.  
We carry a complete stock of Dresses, Hose  
and Repair Sundries.  
All orders filled day received. Write for our prices.  
Improved Bolt Helmet

Submarine Armor and Diving Apparatus.  
We carry a complete stock of Dresses, Hose  
and Repair Sundries.  
All orders filled day received. Write for our prices.

W. L. BROWN, Pres.  
R. L. IRELAND, Vice-President.  
R. C. WETMORE,  
Sec'y. and Treas.  
JAS. C. WALLACE,  
General Manager.

DRY DOCKS IN CLEVELAND.  
No. 1, foot Weddell St., 440 ft. x 50 ft. x 16 ft.  
No. 2, foot Weddell St., 300 ft. x 55 ft. x 13 ft.  
No. 3, Elm St., 340 ft. x 50 ft. x 13 ft.  
Dry Dock at Lorain, 560 ft. by 60 ft. by 17 ft.

THE WM. CRAMP & SONS  
SHIP AND ENGINE BUILDING COMPANY.  
PHILADELPHIA.

SOLE MANUFACTURERS IN AMERICA OF

**Parsons Manganese Bronze  
and Parsons White Brass.**

EDWARD W. HYDE, Pres. H. H. McCARTY, Treas.  
JOHN S. HYDE, Vice-Pres. and Gen. Supt.

BATH IRON WORKS, Ltd.

Ship Builders and Engineers.  
BATH, MAINE.

THE "LONG-ARM" SYSTEM CO.,  
STANDARD INTERCHANGEABLE SHIP--FITTINGS.

CLEVELAND, O., U. S. A.  
ENGINEERS AND MANUFACTURERS

Safety, Electric POWER-DOORS and HATCHES, operated on the  
"Long-Arm" System.  
Small, high and low-duty, three-Cylinder AIR COMPRESSORS  
(light, compact, vertical, electric drive).  
Seamless, steel flasks, leather packings and special valves.

Water-tight Swing Doors, Sliding Doors and Ship Manholes.  
Air Ports, Dead Lights, Deck Lights, Hand Pumps and Magazine  
Lights.  
High-grade electric motors, controllers, motor starters and junction  
boxes.

ALEXANDER McVITTIE, President and Manager.  
WILLIAM C. McMILLAN, Vice-President.

CHARLES B. CALDER, General Superintendent.

M. E. FARR, Secretary and Treasurer.  
FRANK E. KIRBY, Consulting Engineer.

DETROIT SHIPBUILDING COMPANY,  
SHIP AND ENGINE BUILDERS, DETROIT, MICH.

Sole Owners for the Lakes and Atlantic Coast of the HOWDEN HOT DRAFT SYSTEM  
as applied to Boilers, giving increased power and great economy.

Steel Ship Yard Located at Wyandotte, Mich.  
Wooden Ship Yards and Dry Docks, Foot of Orleans  
Street, and Foot of Clark Ave., DETROIT, MICH.



Luck for the  
20th Century  
IN . . .  
**BERTRAM'S  
OIL & PASTE  
POLISH.**

BERTRAM'S OIL AND PASTE POLISH is and has been, for twenty years, the standard of excellence. As a MARINE POLISH, it has no equal.

Every package, except the 3 and 8 oz. cans, contains one of our "20th CENTURY LUCK COINS."

A sample of BERTRAM'S OIL POLISH mailed free of charge, on request.

BERTRAM'S OIL POLISH CO.,  
BOSTON, MASS.

# THE BROWN HOISTING MACHINERY CO., INCORPORATED

Sole makers of the "Brownhoist" High Speed Cantilever and Gantry Cranes. The most economical cranes for covering large areas in steel works or ship yards.

**Machinery For Handling**  
Structural Work, Marine Plates, etc., in Ship Building Yards.

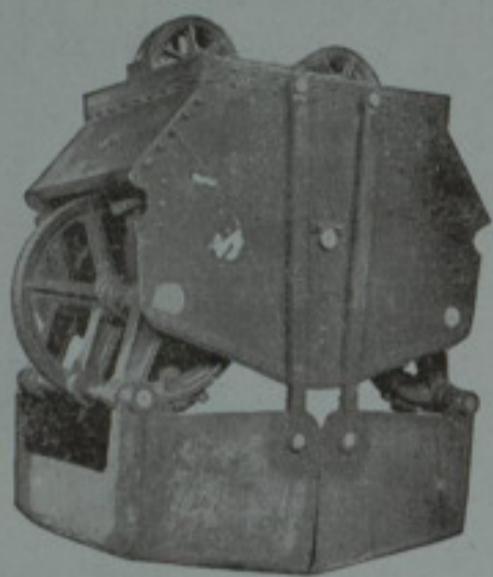
**Coal and Ore Handling Machinery.**

**Cranes of all Types.**  
Steam, Electric and Hand Power.

**Main Office and Works, CLEVELAND, O., U. S. A.**  
Eastern Office, 26 Cortlandt St., New York City. Pittsburg Office, Carnegie Building, Pittsburg, Pa. European Office, 39 Victoria St., London, S.W.

## "CLAM SHELL" BUCKETS FOR IRON ORE.

HULETT PATENTS



The Webster, Camp & Lane Co.  
BUILDERS.

Complete Coal and Ore Handling  
Plants.

Engineering Office CLEVELAND, O., Main Office & Works AKRON, O.

## WE CONVEY AND ELEVATE EVERYTHING.

TACKS, SAND, ROCK, ORES,  
RED HOT IRON, MOLTEN  
SLAG, COAL AND SALT.  
**CONVEYORS  
AND  
ELEVATORS  
MADE BY  
THE C. O. BARTLETT & SNOW CO.  
CLEVELAND, O.**

We have now fitted up three fueling scows which are now in successful operation on the lakes for fueling vessels.

Send for full description.

### Questions and Answers for Marine Engineers.

BY THEO. LUCAS.

Sent postpaid to any address for \$2.00.  
Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland, O.

# GENERATORS & MOTORS

Standard Marine Generating Sets. & & & Complete Hoisting and Power Plants.

Established 1857.

## AMERICAN SHIP WINDLASS CO. PROVIDENCE, R. I.

### SHIP MACHINERY

EMBODYING THE LATEST DESIGNS AND MANY  
IMPORTANT PATENTED IMPROVEMENTS.

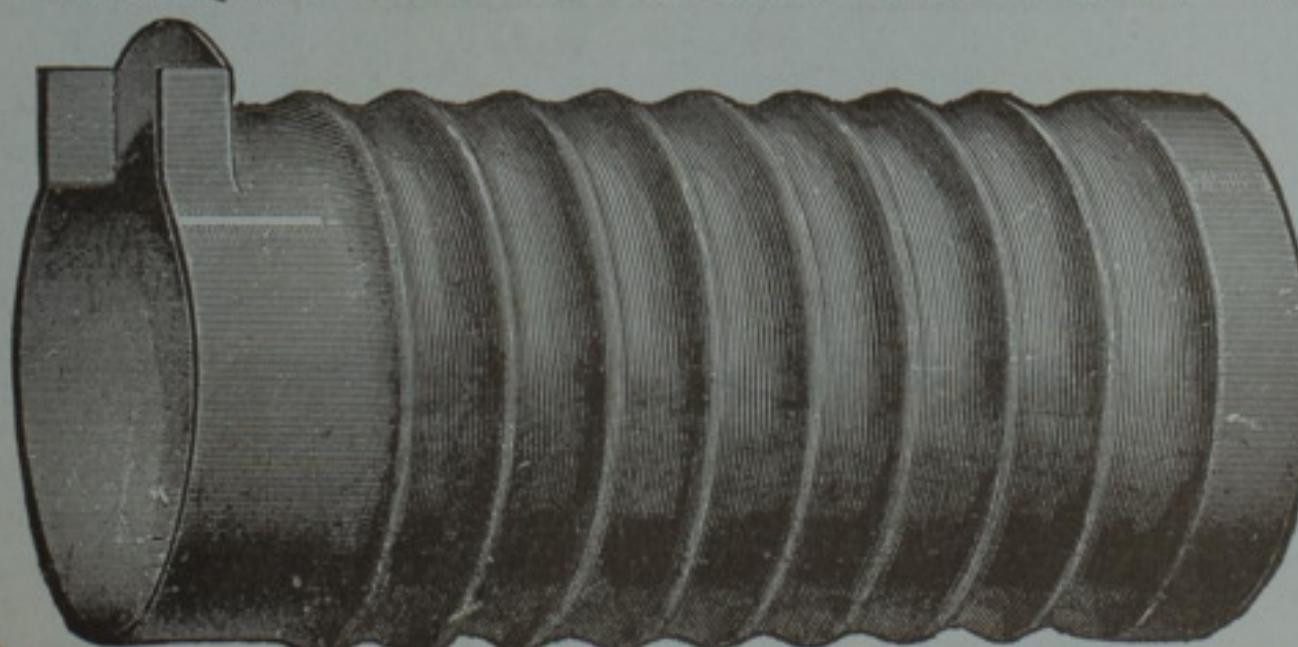
SOLE BUILDERS OF THE

Original and Only Automatic Steam Towing Machine.

SEND FOR ILLUSTRATED CATALOGUE.

Address: FRANK S. MANTON, President.

## MORISON SUSPENSION BOILER FURNACES FOR LAND AND MARINE BOILERS.



UNIFORM THICKNESS—EASILY CLEANED  
UNEXCELLED FOR STRENGTH.

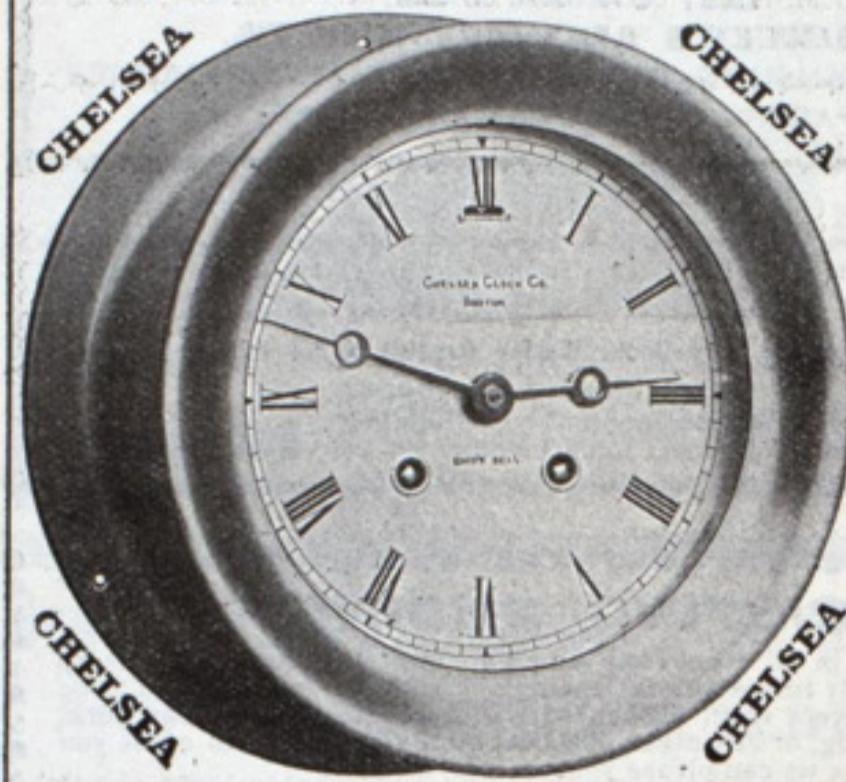
Also Fox Corrugated Furnaces.

MANUFACTURED BY  
THE CONTINENTAL IRON WORKS,  
West and Calyer Sts., NEW YORK.

Near 10th and 23d Sts. Ferries.

Borough of Brooklyn.

**STRIKING SHIP'S BELL CLOCK.**  
8-Day, Jewelled Escapement.  
BEST IN THE WORLD.



Solid Cast Brass  
Screw Bezel Cases,  
Fog and Dust  
proof Cases  
finished in Polish-  
ed Brass, Nickel  
and Black Oxide,  
as ordered. Prices  
f. o. b. Boston, viz.:  
Size, 4½, 6, 8½,  
Price, \$38, \$42, \$45  
Size, 10, 12 in.  
Price, \$50, \$55  
Also if wanted,  
Special BASE for  
using clock on  
desks and mantels,  
etc., at \$7.50 extra  
according to  
size. Hinged Bezel  
Cases \$3.00 extra.  
The 4½ and 6 in.  
sizes in Screw Bezel  
Cases are recom-  
mended as best for  
use on yachts, Ves-  
sels, etc.

ALSO MARINE  
and ENGINE  
ROOM CLOCKS  
of high grade, 4½  
to 12 in. at \$18 to  
\$42, according to  
size; \$3 extra if  
made Non Magne-  
tic for use in Dyna-  
mo Rooms etc.

YOU want the  
BEST. Ask for  
the "CHELSEA"  
Clock.

Striking SHIP'S BELL Clock.  
Patented in United States and Great Britain.  
THE Clock for use on Yachts, Steamships, etc., in pilot  
houses, cabins and each state room.

CHELSEA CLOCK CO., 16 STATE STREET,  
BOSTON, U. S. A.

## THOMAS WALKER & SON,

BIRMINGHAM, ENGLAND.

THE  
"NEPTUNE  
SHIP-LOG

With  
Ball Bearings  
for

HIGH  
SPEEDS.

Also makers of

"CHERUB"

and

"HARPOON"

SHIP-LOGS.

The "NEPTUNE" LOG.

MAKERS TO THE BRITISH NAVY.

## NICHOLSON PERFECTED SHIP LOG.

Detroit, Mich., Oct. 3, 1902.  
NICHOLSON SHIP LOG CO., Cleveland:

Gentlemen:—Both logs are doing all that can be expected of them. Last night on the up trip in a northwest gale the register showed 134 miles from Long point to Southeast shoal lightship, and that is about as correct as can be. If the distances taken off the chart are correct the records of your log are.

JOHN McCALLUM,

Master steamer Western States.

[Western States is one of the very large side-wheel steamers of Detroit-Buffalo Line.]

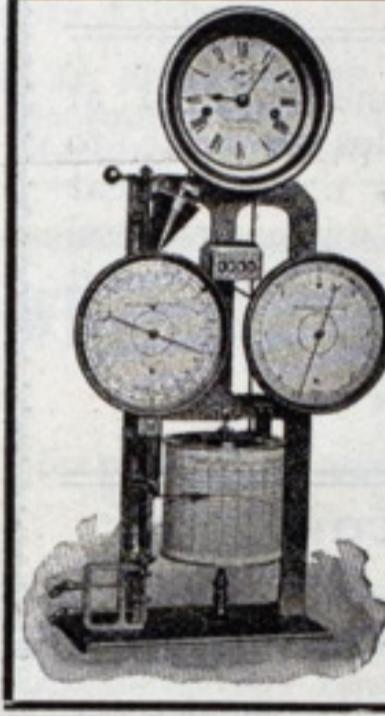
Manufactured by NICHOLSON SHIP LOG CO.  
204 Superior st., Cleveland, Ohio.

EASTERN REPRESENTATIVES

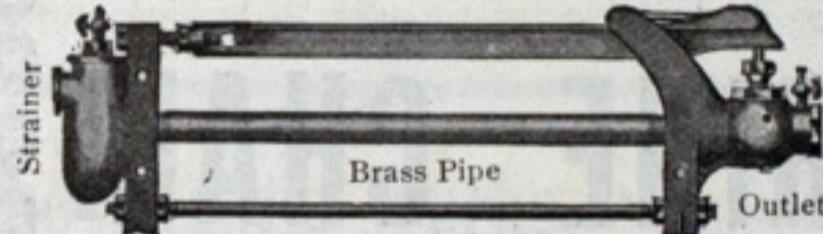
H. E. DANTZEBECHER & CO.

Philadelphia Bourse, Philadelphia  
PACIFIC COAST REPRESENTATIVE

W. H. PIERSON,  
No. 6 California st., San Francisco



Kieley  
Expansion  
Steam Trap  
Best Trap made  
...for..  
Marine Work.



Good for any pressure. Valve opens full area.

Also Reducing Valves, Steam Separators and Open Float  
Traps for Marine Purposes.

Write for Catalogue.

SENT ON TRAIL.

KIELEY & MUELLER, 7-17 West Thirteen Street,  
NEW YORK CITY,

## Steel Works and Rolling Mill Engineers

Garrett-Cromwell Engineering Co.

WILLIAM GARRETT, Manager.

New England Building, Cleveland, O.

## Pintsch Gas Lighted Buoys

Adopted by the English, German, French, Russian and United States Light House Departments  
for Channel and Harbor Lighting; over 1000 gas buoys and gas beacons in service.

Burn Continuously

Brilliant and Steady Illumination.  
Economical and Reliable in Operation.

Controlled by the

SAFETY CAR HEATING and LIGHTING CO.  
160 Broadway, New York City.



**H. A. J. HELVIG.**  
MANUFACTURER OF  
**SHIP LANTERNS**  
and **LAMPS.**

Carried in stock by the leading ship chandlers, who are in a position to make prompt delivery at bottom prices, also

**Side Lights, Bow Lights,  
Anchor Lights, Launch Lights,  
Binnacle Lamps, Cabin Lamps,  
Hand Lamps, Etc.**

228 PEARL STREET,  
NEW YORK.

**Time and Distance Tables for Lake Ships**

A set of tables showing the time required at different rates of speed, 8 to 15 miles an hour, to cover distances between all ports on the Great Lakes. A time saver to the vessel owner or vessel agent as well as captain or engineer. Send for it on approval.

**Price \$1.00**

MARINE REVIEW PUB. COMPANY  
39-41 Wade Building, Cleveland, Ohio

# MARINE CHAIN

OF ALL KINDS.

Ships Cables, Dredge Chains,  
Stud Link and Marine Railway Chains,  
Steam Shovel Chains, Boom Chains, Etc.

CERTIFICATE OF TEST FURNISHED.

# STANDARD CHAIN CO.

PITTSBURGH, PA.

# CRANE VALVES

ESTABLISHED 1855

RALPH DERR, Treas.  
HAROLD LEE, Secy.

H. NEWTON, WHITTELSEY, Pres.

JAMES SWAN, Consult'. N. A.  
F. S. BRINTON, Constructor

# MARINE CONSTRUCTION AND DRY DOCK COMPANY of New York

Steel and Wood Vessels, Yachts, Tugs, Life Boats and Tenders.

Send Specifications and enquiry to—Works: Mariner Harbor, (S. I.) N. Y.  
Telephone, 133 West Brighton.

New York Office, 1023 Maritime Building.  
Telephone, 3404 Broad.

**THE LOCKWOOD MANUFACTURING CO.**

EAST BOSTON, MASS.  
ENGINEERS AND MACHINISTS.  
Builders of STEAMSHIPS, TOW BOATS and MARINE ENGINES  
REPAIRING OF HULLS AND MACHINERY.

**Baltimore Ship Building and Dry Dock Co.**

Ship Building, Dry Dock, Marine Repairs of all Kinds.

470-FOOT SIMPSON DRY DOCK.  
Up-Town Office, No. 602 Continental Trust Building,  
Works and Dry Dock, Locust Point. Baltimore, Md.

**HOISTING ENGINES.**

We build them in all sizes from new and improved designs. Every engine thoroughly tested before leaving our shop, and guaranteed to be satisfactory in every case. When in want of a hoist for marine work, dock work, mining, or any other purpose, kindly permit us to name you prices. We know we can please you.

MARINE IRON CO., - - - - Bay City, Mich.

**FALLS HOLLOW STAYBOLT Co.**

ANY SIZE OUTSIDE OR INSIDE DIAMETER.  
AVERAGE LENGTH OF HOLLOW BARS  
EIGHT TO TEN FEET.  
STAYBOLTS,  
BOTH HOLLOW AND SOLID,  
MADE OF BEST QUALITY DOUBLE REFINED CHARCOAL  
IRON OR STEEL. CUYAHOGA FALLS, O. U.S.A.

Guaranteed to pass U. S. Government or Railway Companies' Specifications and Inspection. Samples furnished on application. Our latest prices will interest you.

**Neversink Cork Jackets and Life Belt.**

Warranted 24 pounds. Buoyancy and full weight of Cork, as required by U. S. Inspectors.

Consolidated Cork Life Preservers. Ring Buoys and Fenders.

SAFEST.

CHEAPEST.

Approved and adopted by U. S. Board of Supervising Inspectors. Also adopted by the principal Ocean, Lake and River Steamer Lines as the only Reliable Life Preserver. Awarded four Medals by World's Columbian Exposition.



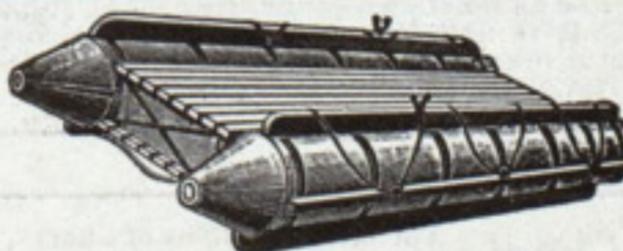
METALLIC  
and  
WOODEN  
LIFE  
BOATS.



Metallic Life Rafts. Marine Drags.  
Manufacturers of Woolsey's Patent Life Buoy—the lightest, cheapest and most compact life raft known.

DAVID KAHNWEILER'S SONS.  
437 Pearl Street, New York City.  
Send for Illustrated Catalogue.

**Thos. Drein & Son.**



BUILDERS of Metallic Life Boats and Rafts. Government and Pleasure Boats, Block and Granulated Cork Life Preservers. Outfits for Lake Steamers a Specialty. Tattnall St. below Railroad. WILMINGTON, DEL.



**LANE & DeGROOT.**

METALLIC LIFE BOATS.

(Formerly Raymond's)  
Metallic Life Rafts, Cork Life Preservers, etc., approved by the U. S. Supervising Inspectors. Also Wood Boats of every description. Repairing of every kind promptly attended to.

305-315 Vernon Ave., Long Island City, N. Y.

Send Specifications and enquiry to—Works: Mariner Harbor, (S. I.) N. Y.  
Telephone, 133 West Brighton.

New York Office, 1023 Maritime Building.  
Telephone, 3404 Broad.

## ROACH'S SHIP YARD.



Delaware  
River Iron  
Ship-Build-  
ing & En-  
gine Works  
Chester, Pa.

Builders of Steamships and Marine Machinery.  
SHIP-BUILDING IN ALL ITS BRANCHES.  
NEW YORK OFFICE, MORGAN IRON WORKS Foot E. Ninth St.

## Newport News Shipbuilding AND Dry Dock Co. SHIP and ENGINE BUILDERS.

Equipped with two large basin dry docks of the following dimensions:

	No 1	No 2
Length on top .....	610 ft	827 ft
Width on top .....	130 ft	162 ft
Width on bottom .....	50 ft	80 ft
Draught of water over sill .....	25 ft	30 ft

Shops are equipped with modern machinery capable of doing the largest work required in ship construction.

Tools driven by electricity and compressed air used in constructing and repairing vessels.

For estimates and further particulars, address

C. B. ORCUTT, President.

No. 1 BROADWAY, NEW YORK.

Works at Newport News, Va. (On Hampton Roads.)

**Fore River Ship and Engine Co.** Successors to *Fore River Engine Co.*  
Steel Ship and Marine Engine Builders.  
CONTRACTORS FOR  
U. S. Torpedo Boat Destroyers Lawrence and Macdonough.  
U. S. Protected Cruiser Des Moines.  
U. S. Battleships New Jersey and Rhode Island.  
U. S. Steam Light-Vessel No. 72.  
OFFICE AND WORKS, QUINCY, MASS. U. S. A.

**MARYLAND STEEL CO.**  
Marine Department,  
Ship Builders and Engineers  
SPARROW'S POINT, MD.

Baltimore Telephone No. 11 - - - A. G. WILSON, Manager.  
Long Distance Telephone Service Between New York, Philadelphia,  
Boston and Sparrow's Point Offices.  
New York Office: 71 Broadway. Boston Office: 70 Kilby Street.  
Philadelphia Office: 312-319 Girard Building.

**The Pusey & Jones Company,**  
**WILMINGTON, DELAWARE.**  
BUILDERS OF Iron and Steel Steamers, Steam  
Yachts, Tow Boats, Marine En-  
gines, Boilers, Tanks, and of  
Heavy Machinery Generally.  
Special Facilities for REPAIRS to both WOODEN and METAL Boats  
MARINE RAILWAY. NO WHARFAGE CHARGED.

**Risdon Iron Works,**  
IRON and STEEL SHIP BUILDERS  
WORKS AT POTRERO, SAN FRANCISCO.  
Office and Branch Works, Steuart and Folsom Streets  
SAN FRANCISCO.

WORKS AND  
MAIN OFFICE, WILMINGTON, DEL.

**The Harlan & Hollingsworth Co.**  
**SHIP BUILDERS,**  
**DRY DOCKING, REPAIRING**  
**AND OUTFITTING.**

(3-4 CENTURY EXPERIENCE.)

NEW YORK OFFICE. { EXCHANGE COURT BUILDING,  
52 BROADWAY, ROOM 702.

### The Allen Dense-Air Ice Machine

Contains no chemicals, only air. Proven by many years' service in the tropics on United States men-of-war, steam yachts and passenger steamers.

A HUNDRED ARE IN DAILY SERVICE ON STEAMERS.  
**H. B. ROECKER, 41 Maiden Lane, NEW YORK**  
Consulting and Constructing Engineer. Designer and  
Manufacturer of Screw Propellers.

## WILLIAM R. TRIGG COMPANY, Richmond, Va.

### BUILDERS OF

Steamships, Steamboats, Ocean and Harbor Tugs,  
Steel Barges, Marine Engines and Boilers.

REPAIRS TO ALL CLASSES OF VESSELS.

**NOW BUILDING:**—U. S. Cruiser Galveston, U. S. Revenue Cutters Tuscarora and Mohawk, U. S. Steel Seagoing Dredge, Steel Tank Steamer for the Standard Oil Co., and several large Tugs for the Pennsylvania Railroad Co. and the New York, Philadelphia & Norfolk Railroad Co.

**The Atlantic Works,** Builders of Steamships,  
Steam Yachts, Tow Boats Etc  
EAST BOSTON MASS.

Marine Engines, Boilers and Tanks.  
Heavy Machinery and Plate Iron Works  
Three Marine Railways.

Mathias Seddinger, President.  
Sommers N. Smith, Vice Pres't. and Gen'l Mgr. ESTABLISHED 1838  
**The Neafie & Levy Ship & Engine Building Company,**  
Penn Works.  
**Iron and Steel Ship and Marine Engine**  
BUILDERS.  
Sole Makers of the Well Known  
**PHILADELPHIA PROPELLER WHEEL.**  
Beach and Palmer Streets. Philadelphia, Pa., U. S. A.

**W. & A. FLETCHER CO.**  
NORTH RIVER IRON WORKS.  
**MARINE ENGINES, BOILERS, Etc.**  
Hudson, 12th and 14th Streets, Hoboken, N. J.  
Take Ferry from foot of West 14th St., N. Y.

**LEWIS NIXON, Shipbuilder.**  
Office and Works, ELIZABETH, N. J.  
Builder of Stern-Wheel, Paddle and Screw  
Steamers; Also Torpedo Boats and Barges of  
all Kinds in Steel.  
A Specialty made of South American and Alaskan River Boats.



## MacLean Hydraulic Signal \*

Best Engine Room Telegraph.

Simple, Powerful, Easily Operated, Sure and Reliable. Last Signal recorded if engineer misunderstands or does not obey signal promptly.

Will not get out of order and needs no readjustment after installing. Can be easily installed. We have whistle and steering signals also for use at either end of the boat; extremely useful and convenient when backing down. For full particulars and illustrations address:

**MacLean Hydraulic Signal Co.**  
317-318 Manhattan Building, CHICAGO.

## • • Buffalo • • Wrought Steel Ranges Are the Best.

Steamboat and Barge Ranges with Rotary Grates.  
No Cog Wheels to Warp or get out of order.  
Don't take our word for it but ask some one using them.

**Russell & Watson, General Steamboat Work**  
BUFFALO, N. Y. Send for Catalogue.

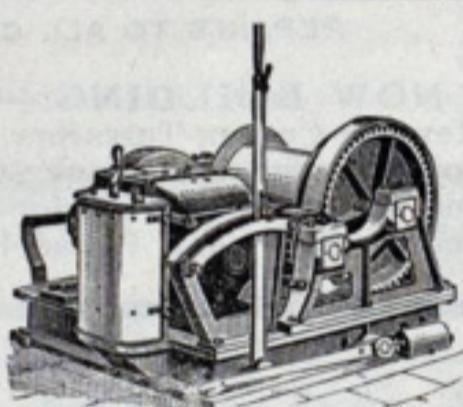
AGENTS—H. C. Weber & Co., Detroit, Mich.  
John Black, So. Chicago, Ill.  
Pritzlaff Bros., Milwaukee, Wis.

**LIDGERWOOD  
HOISTING  
ENGINES**  
OVER 19,000 IN USE.

### ELECTRIC HOISTS

Specially adapted for Docks,  
Warehouses and Steamships.  
**LIDGERWOOD MILLER MARINE CABLEWAY**  
will transfer Coal, Ammunition Supplies, etc. from ship to ship at sea.  
SEND FOR CATALOGUE.

**LIDGERWOOD MFG. CO.** 96 LIBERTY STREET,  
NEW YORK.



## Photographs of Ships, Docks, Etc.

We have a pretty thorough list of active vessels, of docks, elevators, coal and ore handling machinery, etc.  
The price at which we furnish photographs is very low. If you are interested call or write.  
THE MARINE REVIEW PUBLISHING CO.,  
39-41 Wade Building, Cleveland.



**Geo. Stratford  
Oakum Co.**

JERSEY CITY, N. J.  
ESTABLISHED 1860

Manufacturers of  
all grades of

**OAKUM.**  
Spun Cotton.

For sale at Ship  
Chandlers  
everywhere.

## POSTAGE and PRINTING WASTED

Tons of it fail to reach the right people.  
Not so when lists are selected from such reliable publications as the  
**Blue Book of American Shipping.**  
A directory of everything pertaining to ships. List of Ship Owners, Ship  
Masters, Ship Builders, Naval Architects, Marine Engineers.  
The Marine Review Pub. Co., Cleveland, Ohio.

## The Only Standard American Classification of Shipping.



Has Authorized Agents in all the principal ports of the world to protect the interests of its patrons. Vessels built under its rules, or holding certificates of class in this Record of Shipping will, with their cargoes, insure at lowest rates. Office, 66 Beaver Street, New York.

A. A. RAVEN, President.  
W. H. H. MOORE, Treasurer.

W. R. T. JONES, Vice President.  
W. IRVING COMES, Secretary.

## SEIDLER-MINER ELECTRIC CO

DETROIT, MICH.

### Electric Lighting of Ships

### OUR SPECIALTY.

Complete Installations or Reconstruction, Safe,  
Substantial and Efficient. DEALERS IN  
Marine Electrical Supplies and Special Fittings.  
Catalogue and Marine Rules on application

WEEKLY.

ILLUSTRATED.

PRICE 6D.

## "THE SHIPPING WORLD"

Written by Experts

Illustrated by Artists

ANNUAL SUBSCRIPTION, UNITED KINGDOM \$5.11  
OTHER COUNTRIES \$6.82

Contains the best and most informing  
illustrated literature regarding

**Naval Architecture**

**Marine Engineering**

**Commercial & Shipping**

**Questions of the Day**

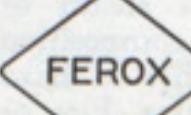
## The Shipping World Ltd.

Effingham House, Arundel Street, Strand,  
LONDON, ENGLAND.

Subscriptions and advertisements for The Shipping World accepted at The Marine Review offices.

The  
Ideal  
Pigment

TRADEMARK



REGISTERED JULY 8, 1902



The only adequate protection for Ships,  
Bridges and Structural Iron  
and Steel Work.

## Mohawk Paint & Chemical Co.

SOLE MANUFACTURERS OF

### Patent Iron Oxide Paints

98% Pure

19 Liberty Street, New York.

The only **Pure** Iron Oxide Paint.  
The only Non-Crystalline Oxide of Iron.

Being porous and spongy it absorbs and retains the oil and makes a permanent, durable, unchanging, protective coating for wood and metals.

It is rust-proof and not subject to chemical action.  
Unequalled for submarine use.

SEND FOR DESCRIPTIVE CIRCULAR.

## Chas. E. & W. F. Peck

ESTABLISHED 1870

58 William Street, New York City.  
Royal Insurance Building, Chicago, Ill.

C. T. BOWRING & CO., Ltd.  
5 and 6 Billiter Ave., LONDON, E. C., ENGLAND,  
AND AT "LLOYDS," LONDON.

## Insurance Brokers

As brokers we represent ONLY THE ASSURED. Our clients being the VESSEL OWNERS, we refuse to represent insurance companies. We place insurances in the most advantageous market at the best procurable rates and terms. We leave it to the managers and general agents of insurance companies to protect the interests of their companies, maintaining that it is impossible for us to devote ourselves to the interest of both the owners and the insurance companies at the same time.

### Average Adjusting Department

Williamson Building, Cleveland, Ohio.

## GREAT LAKES REGISTER.

INCORPORATED.

Combined and Issued in Connection with the

**BUREAU VERITAS**

INTERNATIONAL REGISTER OF SHIPPING.

Great Lakes Register desires to announce that its ratings go before the leading Underwriters of America, England and France.

THE SERVICES OF ITS SURVEYORS MAY BE ENGAGED ON HULL AND CARGOES

F. D. HERRIMAN, SURVEYOR GENERAL,  
320-322 Perry-Payne Building, - - - CLEVELAND, O.

## CRANE FITTINGS

ESTABLISHED 1855

## YOU MAY MAKE EXPERIMENTS

with other pigments; but when the experiments are finished you will only have further proof that

## ZINC WHITE

Is the only white pigment that will stand exposure to marine conditions. There is no other white pigment available for ship builders.

### FREE—Our practical Pamphlets:

- "The Paint Question,"
- "Paints in Architecture,"
- "House Paints: A Common Sense Talk About Them."
- "Specifications for Architects,"
- "French Government Decrees."

## THE NEW JERSEY ZINC CO.,

11 Broadway, New York.

## INSURANCE

**Geo. L. McCurdy,**  
169 Jackson Boulevard,  
Chicago, - - Illinois.

Direct Representative of Leading  
American and Foreign Under-  
writers.

## HULLS AND CARGOES.

### INSURANCE COMPANY OF NORTH AMERICA.

232 Walnut Street, :: PHILADELPHIA :: Founded A. D. 1792  
Fire, Marine and Inland Insurance. Charter Perpetual.

CAPITAL STOCK	\$3,000,000.00
Reserve for Reinsurance	4,868,952.10
Reserve for unadjusted losses and other liabilities	845,012.46
Surplus over Liabilities	1,988,589.05
Total Assets, January 1, 1902	10,702,583.61

This Company issues certificates of insurance, payable in cases of loss at the option of the assured, in London, Paris, Antwerp, Bremen, Hamburg, Amsterdam, Japan, China and Australia.

CHARLES PLATT, President

HENRY W. FARNUM, Marine Secy.

## The Donnelly Salvage and Wrecking Co., Ltd.,

JOHN DONNELLY, Sr., Pres.  
JOHN DONNELLY, Jr., Vice-Pres.  
H. B. FOLGER, Treas.  
THOS. DONNELLY, Secy.

KINGSTON ONT.

## DIVERS, STEAM PUMPS, TUGS, Etc.

SUPPLIED ON SHORTEST NOTICE.

## NEW HARBOR CHARTS OF THE LAKES.

Following is a list of harbor charts recently issued from the United States Lake Survey Office, all in colors: Duluth and Superior Harbors, Two Harbors, Ashland, Marquette, Milwaukee, Chicago, Muskegon, Toledo, Sandusky, Cleveland, Lorain, Fairport, Ashtabula, Conneaut, Erie, Dunkirk and Buffalo.

For sale by THE MARINE REVIEW PUB. CO.,

39-41 WADE BUILDING,

CLEVELAND, O.

J. B. COWLE, Pres.

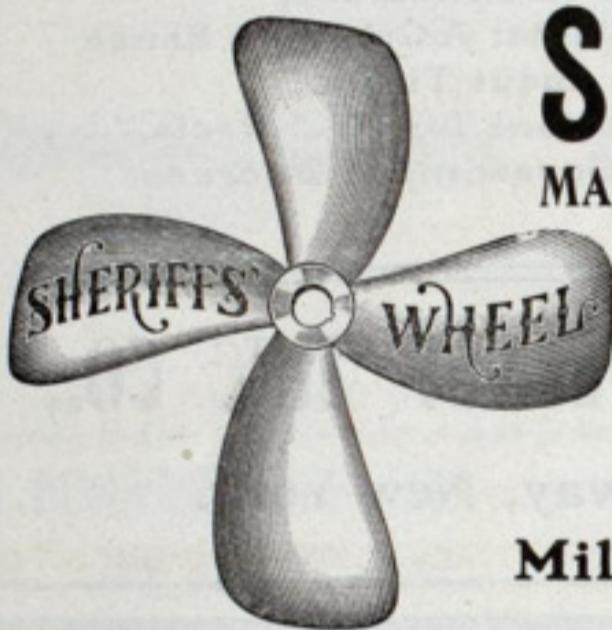
W. E. PERKINS, Sec'y and Treas.  
MAT. THOMAS, Gen'l Mgr.

## The Union Machine &amp; Boiler Company,

MACHINISTS, FOUNDERS AND BOILER MAKERS.

Jobbing solicited. Steel vessel repairs promptly attended to night or day.  
108 TO 114 RIVER STREET. CLEVELAND, O.

Phones: Bell Main 609. Cuy. A. 711. Night Call Cuy. M. 1843.

SHERIFFS  
MANUFACTURING CO.

Manufacturers of  
PROPELLER  
WHEELS

Marine Engines  
and Repairs.

Milwaukee, Wis.  
Phone S. 163

## Thearle's Works on Ship Building.

STANDARDS IN ENGLAND AND SCOTLAND.

KNOWN AND USED WHEREVER STEEL SHIPS ARE BUILT.

SEPARATE VOLUMES FOR PLATES.

"Ship Building in Iron and Steel." (Plates in separate volume.) \$5.25.  
"Ship Building and Laying Off." (Plates in separate volume.) \$3.00.  
"Theoretical Naval Architecture." (Plates in separate volume.) \$3.50.

THE MARINE REVIEW PUB. CO.,  
39-41 Wade Bldg., CLEVELAND

SMOOTH-ON  
TRADE MARK

## IRON CEMENT No. 1.

Unequalled for repairing leaks or fractures in steam or hydraulic work. This cement is a metallic composition which upon being mixed with water becomes a hard metallic iron that will withstand Steam, Water, Fire or Oil, and expands and contracts the same as iron, which makes it invaluable for boiler patching, making flanged joints, stopping leaking boiler seams, etc. Joints easily taken apart.

Write for free 60 page Illustrated Book.

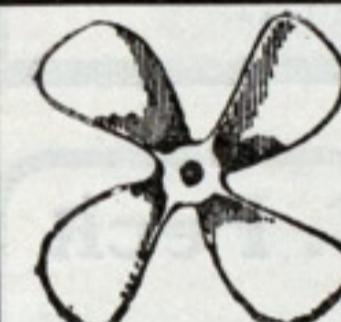
Smooth-On is for sale by leading supply houses, and is sold in 5, 10 and 25 pound tins.

## SMOOTH-ON MFG. CO.

572-574 Communipaw Avenue,  
JERSEY CITY, N. J., U. S. A.

ABRAM SMITH & SON,  
ALGONAC, MICH.WOODEN SHIP BUILDING  
AND REBUILDING.

Before placing your work we will be pleased with an opportunity to quote YOU our prices.



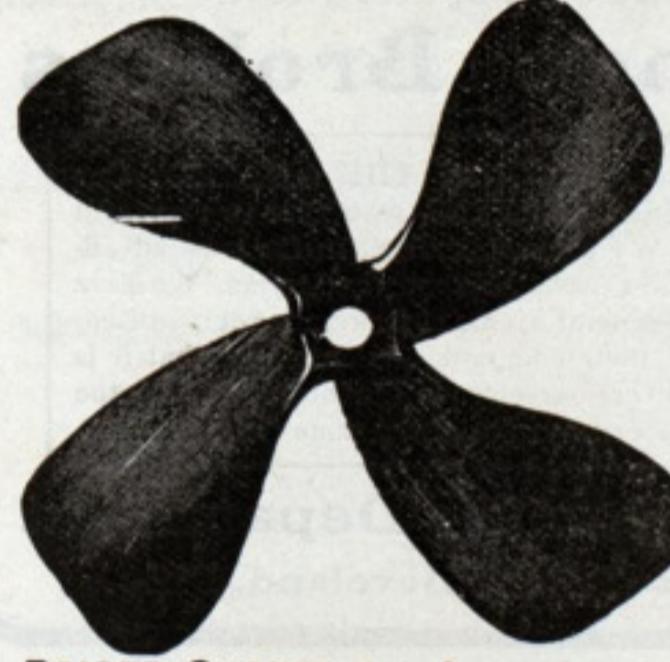
## MacKinnon Manufacturing Co.

Boiler Makers, Founders and Machinists.  
Marine Boilers, Engines and Shipyard Machinery,  
Most powerful set of Hydraulic Slings on  
the lakes. Best towing and speed  
Propeller Wheels made.

SPECIALTY SMALL YACHT WHEELS.  
Works & Office, 224-230 N. Water St., BAY CITY, MICH

H. G. TROUT,  
KING IRON WORKS,

BUFFALO, N. Y.



PRICES QUOTED ON APPLICATION.

Manufacturers of  
Triple Expansion,  
Fore-and-Aft

AND  
Steeple-Compound  
Marine Engines,

High and Low Pressure  
Engines, Sectional  
Propellers, Tug and  
Yacht Wheels.....

Cowles' Aluminum and  
Manganese Bronze Pro-  
peller Wheels,

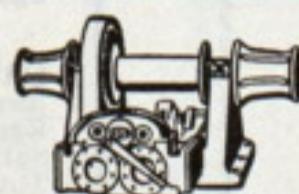
These wheels are noted  
for their extra speed,  
towing power and pro-  
portionate saving of  
coal.



## GASOLENE MARINE ENGINES

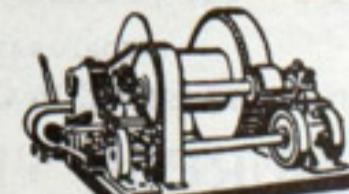
Suitable for all Boats from 3½ to 200 H.P.  
Over 100 in successful use.  
Also the well known and always  
reliable Wootters Gas or Gasolene  
Stationary Engines.

FOR THESE AND OTHER WELL KNOWN SPECIALTIES ADDRESS ALL INQUIRIES TO.



## HOISTING ENGINES

Of all kinds and sizes, and  
for all purposes, especially  
for ship use.  
Docking and Hauling Engines  
and Wire Rope Windlasses.



## AUTOMATIC TOWING MACHINES

Somewhat the cheapest, and  
altogether the best. Positively  
guaranteed.  
Automatic Fog Whistle Machines  
Steam Steering Engines.

THE CHASE MACHINE CO. Engineers and Machinists, CLEVELAND, OHIO.

## The Martin-Barriss Co.

IMPORTERS AND MANUFACTURERS OF

*Mahogany, White Mahogany,*  
AND ALL NATIVE CABINET WOODS.

HIGH GRADES OF KILN DRIED WOODS FOR  
CABIN WORK AND INSIDE TRIM.

*White Oak Timbers and Plank*

CONSTANTLY ON HAND AND SAWED TO ORDER  
ON SHORT NOTICE.

654 Seneca Street,

Cleveland, O.

## AIDS TO NAVIGATION

are of vital importance to vessel interests.

### SCHERZER ROLLING LIFT BRIDGES

aid navigation and meet with the approval of all vessel interests, because of the wide and unobstructed channel provided for navigation, enabling vessels to pass easily and rapidly through the draw.

THE SCHERZER ROLLING LIFT BRIDGE CO.,

MAIN OFFICES: 1616 MONADNOCK BLOCK,  
CHICAGO, U. S. A.

All of the latest and largest LAKE STEAMSHIPS are completely equipped with

**BLAKE**

DUPLEX AND SIMPLEX SPECIAL MARINE PUMPS.

New Marine Catalog ready about July 1st.

Geo. F. Blake Mfg. Co.

114 Liberty St., :: :: :: NEW YORK CITY.

## Latest Patent Anchors

THE  
National and International.

APPROVED BY LLOYD'S.

Manufactured by

L. M. BOWERS & CO.,  
Binghamton, N. Y.

Furnished to  
Lake Trade by

The Upson-Walton Co.,

CLEVELAND



CATALOGUE ON APPLICATION.

BALDT ANCHOR CO.  
CHESTER, PA.  
U.S.A.

SHOWING  
ANCHOR IN  
POSITION—  
STOWED IN HAWSE  
PIPE

## THE PRYOR PATENT DIPPER TOOTH

### For Dredges and Steam Excavators.

is made entirely of open-hearth steel in two parts, a shank and a removable point. The shank is bolted onto the dipper in the usual way and remains stationary, while the removable point is placed over the shank and is bolted thereto.

A full set of four points can be changed in from ten to fifteen minutes, whereas it takes a much longer time to change a full set of the old-style cumbersome iron teeth. These teeth will wear 100 per cent longer than the iron teeth, steel tipped, and will increase capacity of the dredge materially in hard digging.

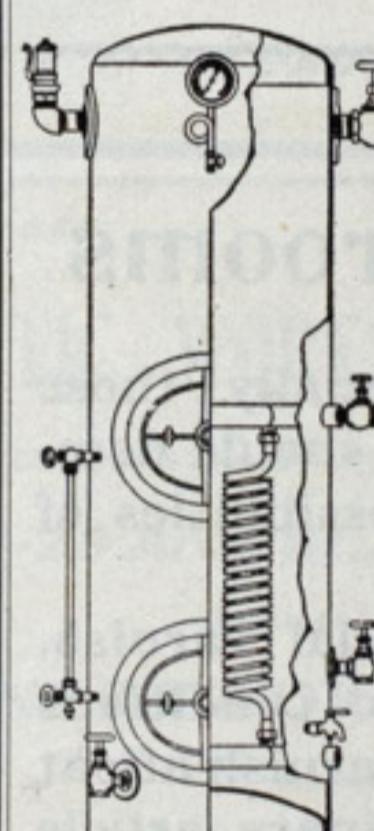
The Pryor Patent  
Excavator Tooth Co.,  
HOUGHTON, MICH.

## De Grauw, Aymar & Company.

ESTABLISHED 1827.

Cordage, Oakum, Vessel  
and Railroad Supplies.

SOLE MANUFACTURERS IN THE UNITED  
STATES FOR  
**TYZACK'S STOCKLESS ANCHORS.**  
NEW YORK CITY.



Evaporating and . . .  
Distilling Apparatus.

### FOR MARINE PURPOSES

The Most Efficient, Compact, Accessible  
and Lightest Made.

GENERAL ENGINEERING  
SPECIALTIES AND SUP-  
PLIES . . . . .

JAMES REILLY  
REPAIR and SUPPLY CO.

229 and 230 West Street, New York.

One of these binders, that will hold a complete volume  
of the



Marine  
Review

and Marine Record,

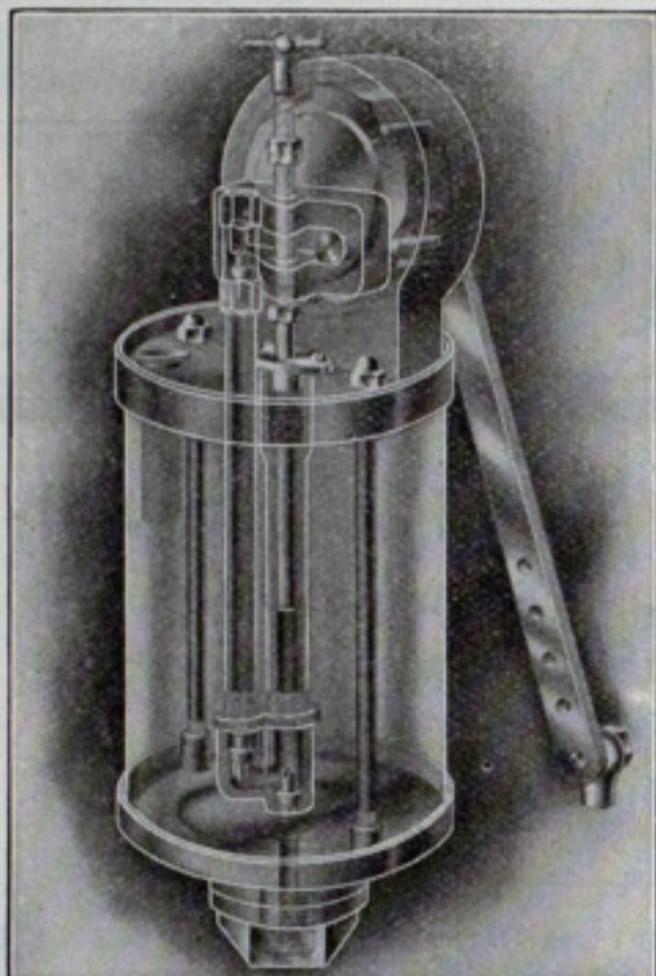
will be mailed  
to any address  
on receipt of

\$1.

THE MARINE REVIEW PUB. CO., 39-41 Wade Bldg. CLEVELAND, O.



## Force Feed Lubricator



(McClure Patent)

### **Roller Bearing Driving Mechanism**

Insuring  
**Positive Speed**  
at any speed of engine.

### **Fine Regulation**

Will feed any oil from very light to heavy oils which cannot be handled by a hydrostatic cup.

Designed for Marine use by a marine engineer.

Manufactured and guaranteed by

PENBERTHY INJECTOR CO. 346-364 Holden Ave.  
DETROIT, MICH.

Largest Injector manufacturers in the world.

## IF IN DOUBT WHAT INJECTOR TO BUY RUN NO RISK BUT GET THE **U. S. Automatic Injector**

### Three Safeguards Against Disappointment:

1. Each Injector is carefully tested on varying lifts and pressures before leaving the factory, and a card attached showing its range and grading capacity.
2. Any dealer will guarantee the U. S. Injector, because—
3. We stand back of the dealer, and will replace any Injector that doesn't work rightly, or refund the purchase price, if necessary.

Our guarantee of absolute reliability brings us hundreds of new customers each season. Full particulars and many items of interest are contained in our "Engineers' Pocket Reference Book."

Shall we send a copy?

**American Injector Co.,**  
DETROIT, MICH.

## Cabins and Staterooms

of modern vessels, especially those in the passenger service, should demonstrate the supreme possibilities of the wood finisher's art.

This demands a special varnish, however, as atmospheric conditions are more destructive to varnish afloat than ashore and the ordinary article is of but little use.

The varnish best adapted to withstand the deleterious influences of wind, wave and weather is "**BERRY BROTHERS' SPAR VARNISH.**"

Further particulars and a unique marine puzzle sent free for the asking. Write us.

**Berry Brothers, Limited,**

Varnish Manufacturers,

NEW YORK  
CHICAGO

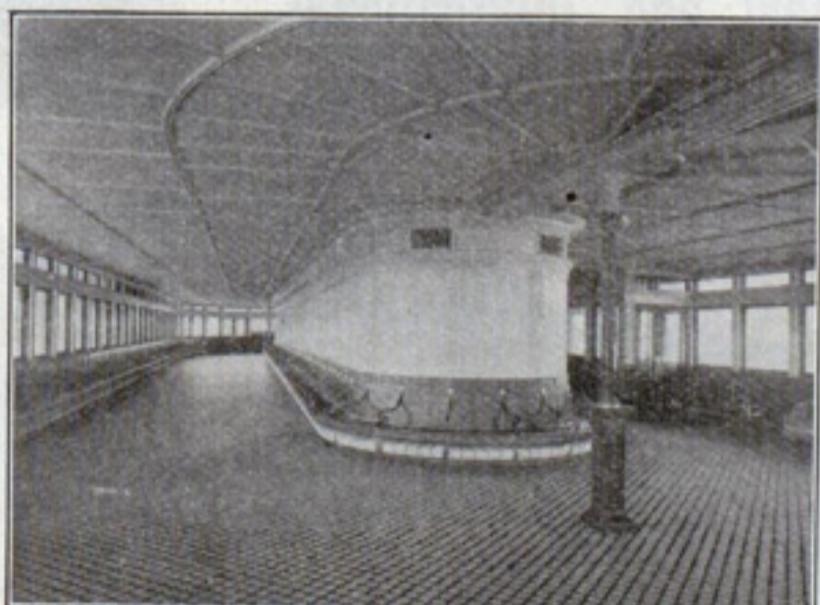
BOSTON  
CINCINNATI

PHILADELPHIA  
ST. LOUIS

BALTIMORE  
SAN FRANCISCO

Factory and Main Office,  
DETROIT.

## INTERLOCKING RUBBER TILING.



Is noiseless, non-slippery, waterproof and thoroughly sanitary, more durable than stone or earthen tiles, elegant in appearance, manufactured in a carefully selected variety of colors. Endorsed by the best architects and engineers. A perfect floor for business offices, banking-rooms, court-rooms, vestibules, halls, billiard-rooms, smoking-rooms, cafes, libraries, churches, hospitals, hotels, etc. It is especially and peculiarly adapted for Steamships, Yachts, etc. It stands the constant straining and racking without cracking or separating, and its non-slippery feature is of high value. Samples, estimates and special designs furnished upon application. Sole manufacturers.

**NEW YORK BELTING & PACKING CO. Ltd.**

25 PARK PLACE

NEW YORK

PHILADELPHIA, 724 Chestnut St.  
BALTIMORE, 101 Hopkins Place.

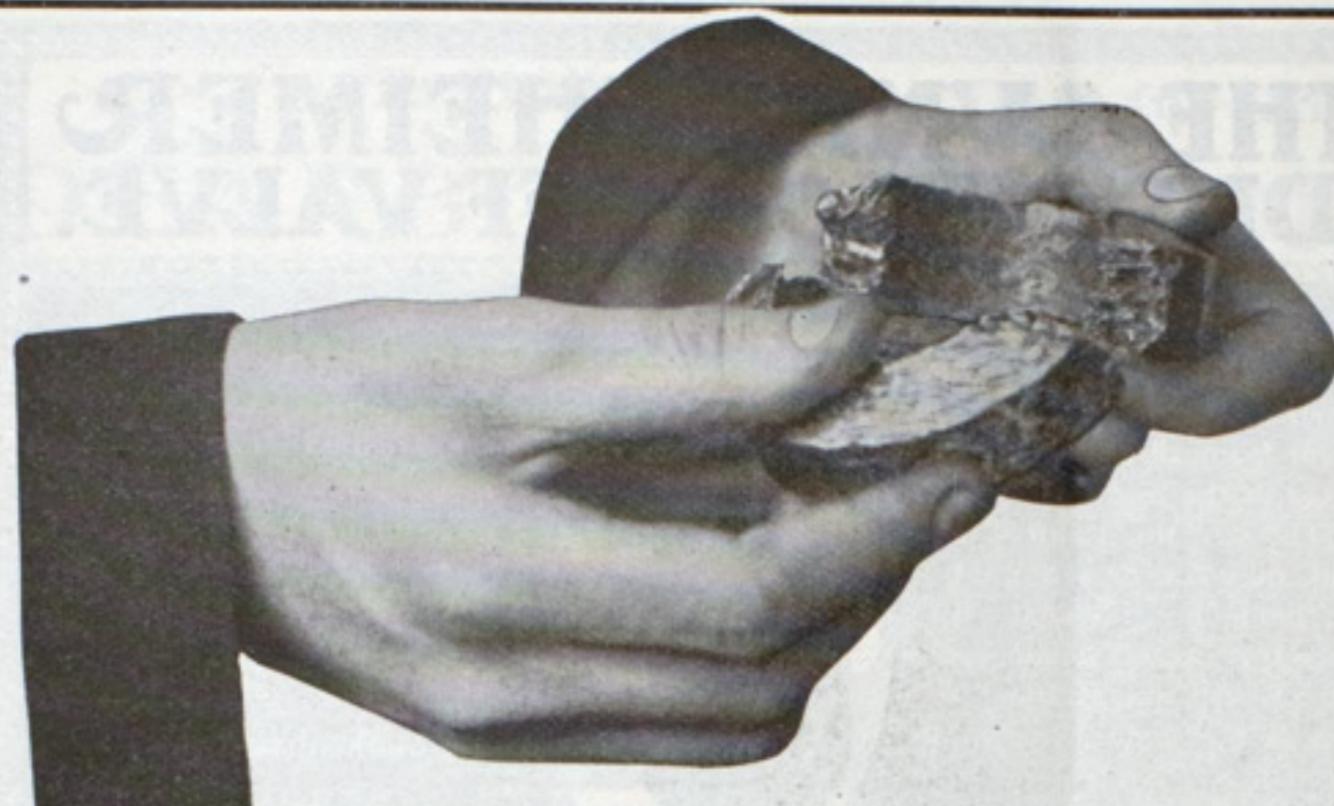
CHICAGO, 150 Lake St.

BOSTON, 24 Summer St.

INDIANAPOLIS, 229 So. Meridian St.

ST. LOUIS, 411 No. Third Street.

SAN FRANCISCO, 509-511 Market St.



Through the medium of the Marine Review we desire to call your attention to

## MICA METALLIC PACKING.

It is adapted to Air, Steam, Water or Gas, and it is self-lubricating too. Our circular tells.

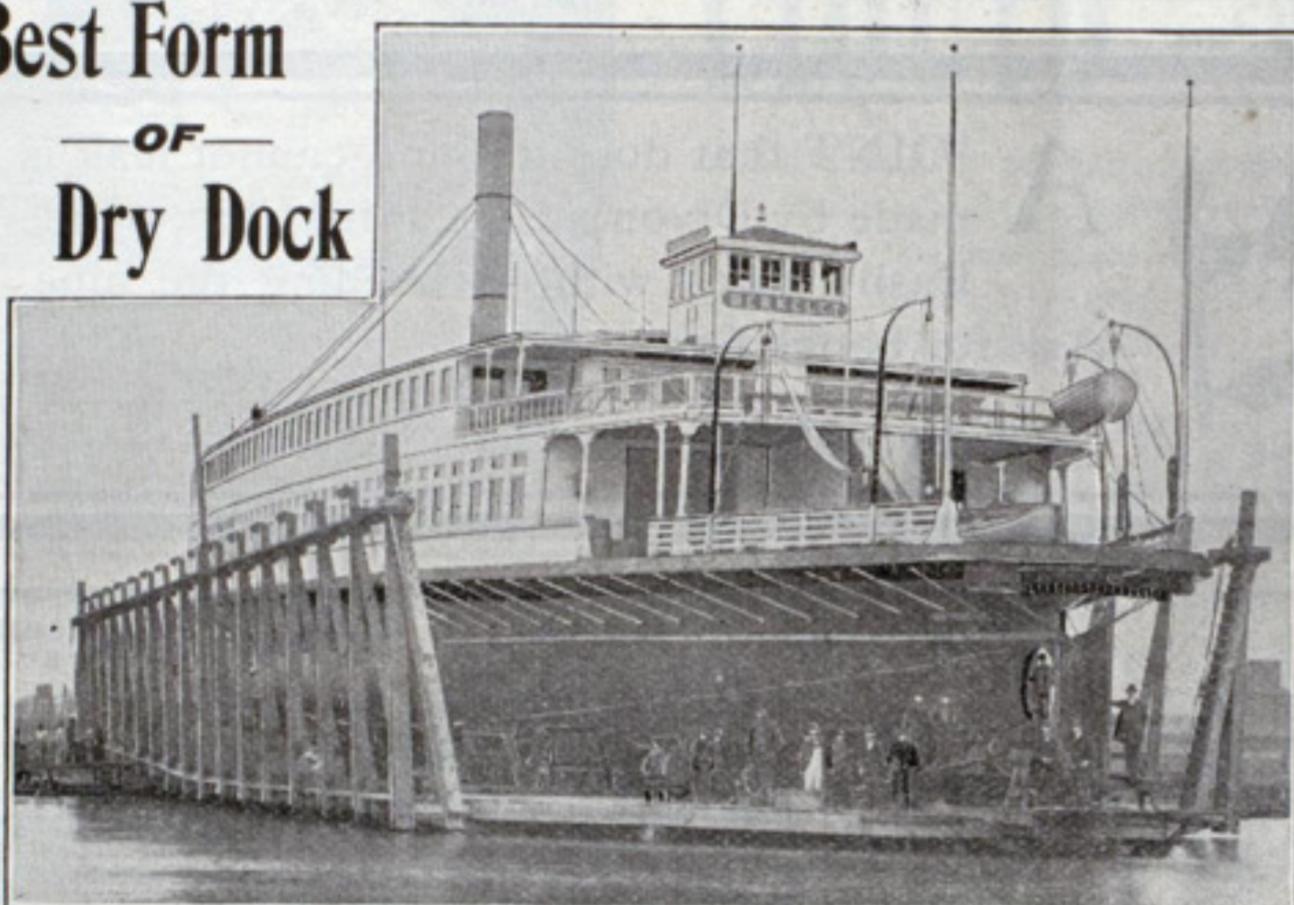
### AMERICAN METALLIC PACKING COMPANY,

1610 Williamson Building,  
Cleveland, Ohio.

**Best Form**

—OF—

**Dry Dock**



Crandall's Modern Marine Ry's.

**SAFE.**  **RAPID.**

**BUILT of STEEL or WOOD  
ANY SIZE.**

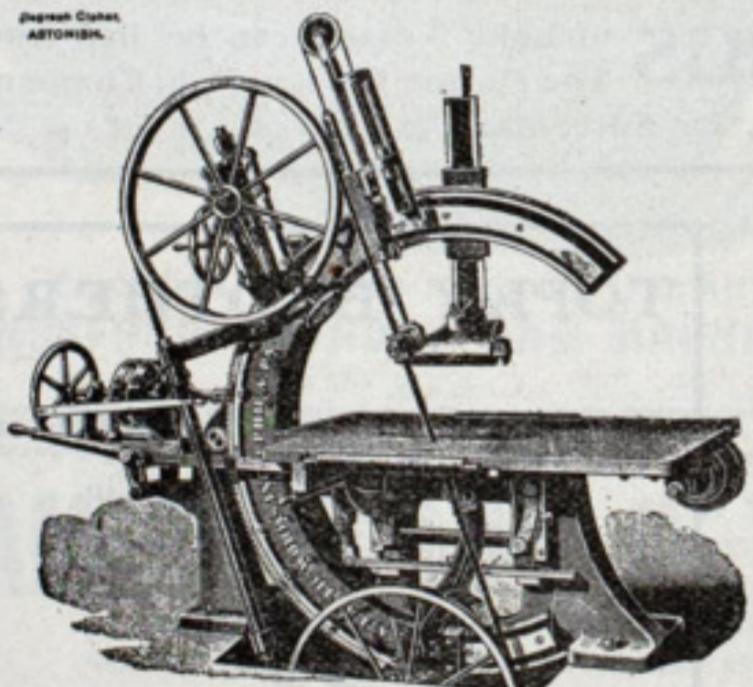
**H. I. Crandall & Son Co.,**

(INCORPORATED.)

**Contracting Engineers.**

**EAST BOSTON MASS. U. S. A.**

Ingenier Copes.  
ASTORISH.



ADJUSTABLE BEVEL BAND SAW.  
Will bevel both ways to 45 degrees.  
Power Movement to change angles.  
Power feed in three directions.

ESTABLISHED 1869.

INCORPORATED 1896.

## ATLANTIC WORKS INCORPORATED,

*Successors to Berry & Orton Company.*

**2223-25-27-29 Arch St., Philadelphia, Pa., U.S.A.**

MANUFACTURERS OF

**MACHINERY FOR WORKING WOOD**

FOR USE IN

**Ship Yards, Car Shops, Railroad Shops.**

SEND FOR CATALOGUE.

Hollow Chisel Mortisers.

ESTIMATES FURNISHED.

Car Sill Dressers.

....THE....  
**David Bell Engineering Works**  
BUILDERS OF  
STEEL TUGS, YACHTS, ETC.  
MARINE MACHINERY STEAM HAMMERS  
BUFFALO, N. Y.

**C. H. McCutcheon,**  
Copper, Tin and Sheet Iron Marine Work. Engineers' Supplies. # # #  
Brass Cocks, Globe Valves and Couplings, Iron Pipe Fittings and Supplies, Rubber Hose, Packing, Springs, Usudurian Packing. **Buffalo, N. Y.**

## The Blue Book of American Shipping

The only Marine Directory of the United States containing names and addresses of Ship Owners, Ship Masters, Ship Builders, Naval Architects, Marine Engineers and of every interest active in the Shipping Field. Also Statistics of Shipping and Ship Building in America. :: :: :: :: :: :: Sent on approval

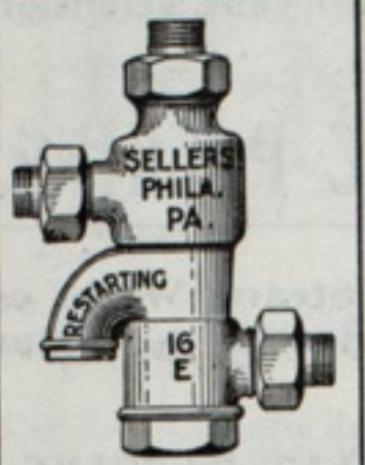
Marine Review Publishing Company,

39-41 Wade Building,

Cleveland, Ohio.

**Price  
\$ 5.00**

## Sellers' Restarting Injector



A strictly first class machine at moderate cost.

Perfectly automatic, has wide range of capacities, and raises water promptly with hot or cold pipes.

Very simple, has few parts and is easily repaired.

All parts interchangeable, made of the best bronze, and the workmanship is perfect. Send for special catalogue descriptive of this Injector.

JENKINS BROTHERS, Selling Agents  
NEW YORK, BOSTON, PHILA., CHICAGO

## REED'S ENGINEERS' HAND-BOOK.

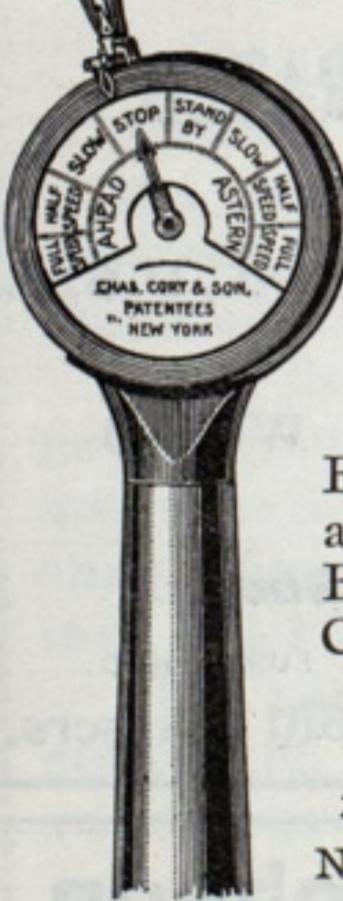
Seventh Edition.

Revised and Enlarged.  
Including set of plates  
and supplement containing  
New Elementary  
Questions and Answers

Price \$5.00

At office of  
**Marine Review Pub. Co.,**  
40 Wade Bldg., Cleveland, O.  
By Express—45 Cents Extra.

### Chas. Cory & Son,



Manufacturers of  
Mechanical  
and  
Electrical  
Telegraphs  
and  
Indicators.

Engine Bells  
and  
Electric  
Call Bells.

278-279 Division St.  
NEW YORK CITY.

### Queen City Patent Hydraulic Steerer.

The **BEST** and **MOST**  
**RELIABLE**.

Has Large Hand  
Wheel.

Can be Changed from  
Power to Hand Steer-  
ing Instantly.

A Favorite with  
Pilots.

SEND FOR REFERENCES

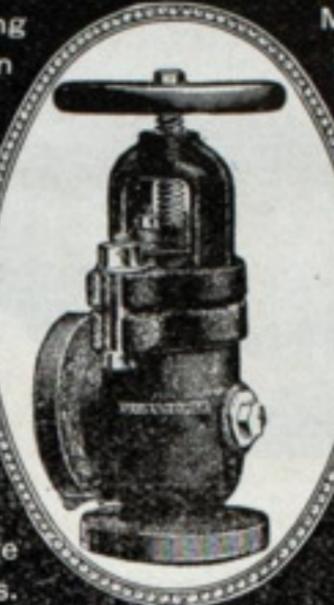
QUEEN CITY ENGINEERING CO., Buffalo, N.Y.

## THE LUNKENHEIMER "DURO" BLOW-OFF VALVE.

A VALVE with self-cleansing seat, simple and practical in construction, and entirely different from all other blow-off valves in the market.

The way the "Duro" is built, no scale or sediment can lodge on the seat. If you want a practical success and a Valve that will last as long as the boiler, you want the "Duro." No boiler should be without one.

Made in screw ends, flange ends, and screw and flange ends.



Made in 2, 2½ and 3 inch sizes. Every Valve tested, inspected and warranted to give complete satisfaction. Specify the "Duro" and order one from your dealer.

Write for Catalog of brass and iron steam specialties and engineering appliances of superior quality.

The Lunkenheimer Company  
SOLE MAKERS  
Cincinnati, Ohio, U. S. A.

BRANCHES: NEW YORK: 26 Cortlandt St.  
LONDON: 35 Great Dover St.

(18)



A JOINT that does not leak is made by Dixon's Pipe Joint Compound. Easily upset without bending the pipe. Ask for booklet 77.

JOSEPH DIXON CRUCIBLE CO., JERSEY CITY, N. J.

### Chicago Nautical School, Seventh Year.

#### MASONIC TEMPLE, CHICAGO.

W. J. WILSON, Principal. (Late Lieutenant, U. S. N.)

A full and complete course of instruction in Lake and Ocean Navigation and Marine Engineering. Also special branches taught those desiring to qualify themselves for better positions in the Marine Service. Students taught by correspondence. Students may begin at any time. Diplomas will be issued to all graduates passing satisfactory final examinations. Send for circular.



**WINTER MOORINGS** of Lake Vessels can be had from  
The Marine Review Pub. Company  
39-41 Wade Building, Cleveland, Ohio, for 50 cents. \* \* \* \* \*

### FARNAN Brass Works

CLEVELAND, O.

23 Center St.  
(near the bridge.)

OIL PUMPS,  
WHISTLES,  
GOVERNMENT  
PLUGS, ETC.

MARINE WORK  
TO ORDER.



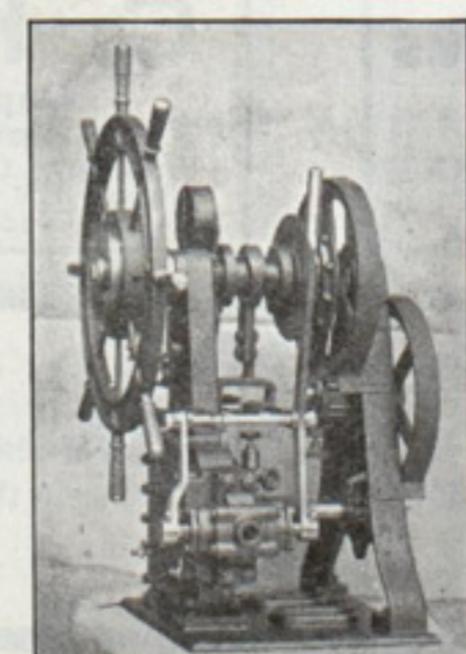
### TOPKY BROTHERS

Ship Hardware, Tinware, Paints, Oils and  
Glass, Rope, Plumbing, Tin,  
Galvanized Iron and  
Copper Work.

\* \*

Repairs for all makes of Ranges.

67 BRIDGE ST. ASHTABULA, O.



### THE DAKE PILOT HOUSE STEAM STEERER.

A Simple Compact and Durable  
Machine. Occupies Small Floor  
Space.

Write for descriptive circulars and prices.

MANUFACTURED BY  
**The Dake Engine Co.,**  
GRAND HAVEN, MICH.

In fitting out your fleet for the coming season

## DEARBORN BOILER COMPOUND

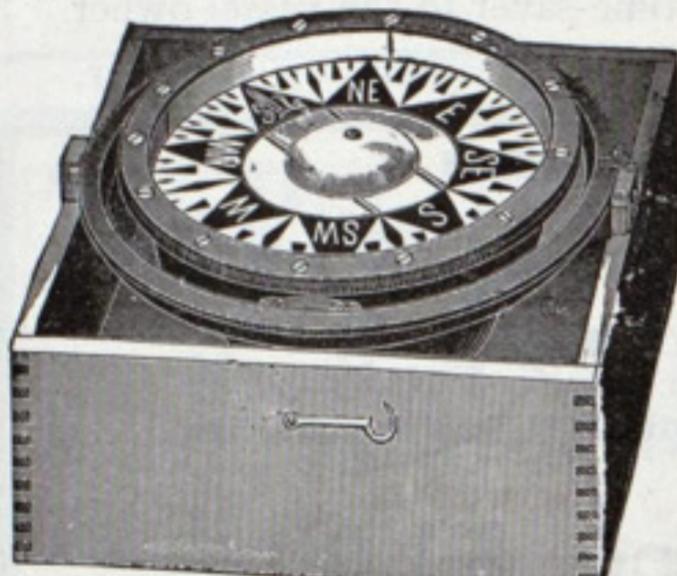
should be one of the first articles purchased. What is more vital to the safe and economical operation of a vessel than clean, well preserved boilers?

## DEARBORN DRUG & CHEMICAL WORKS

27-34 Rialto Building, CHICAGO, ILL.

WM. H. EDGAR,  
PRESIDENT.

Telephone Harrison 3930 and 3931

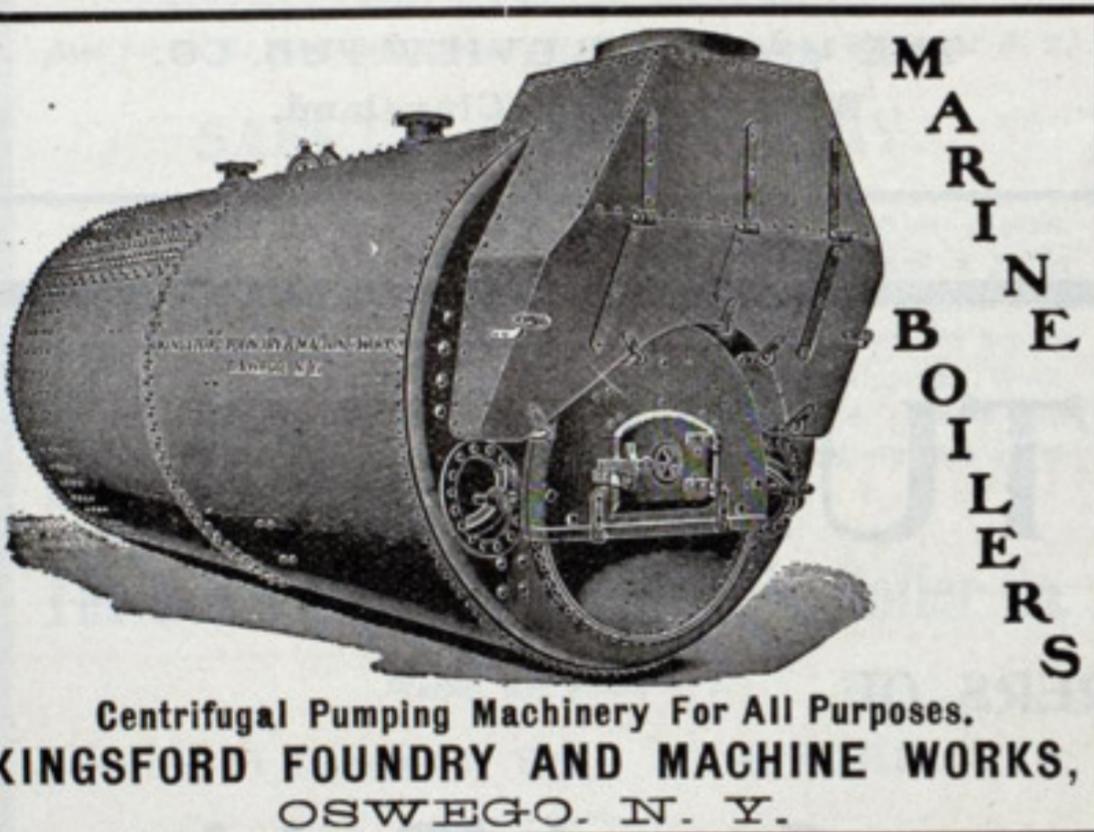


## LIQUID -SPIRIT- COMPASSES

of our make, in seven sizes, embody every known point of excellence possessed by those of other makers, and in addition have been improved in many important details.

We therefore positively assert that, in general construction and thoroughly scientific action of the card, we offer the best Liquid Compass ever made in this or any country. For sale by Ship Chandlers generally.

**JOHN BLISS & CO., 128 Front St., NEW YORK.**



Centrifugal Pumping Machinery For All Purposes.  
**KINGSFORD FOUNDRY AND MACHINE WORKS,**  
OSWEGO, N. Y.

**AMERICAN LINE** NEW YORK  
SOUTHAMPTON  
LONDON  
CALLING AT CHERBOURG WESTBOUND.

Sailing From New York Every Wednesday at 10 A. M.

ST. LOUIS (11,629 tons), ST. PAUL (11,629 tons),  
NEW YORK (10,674 tons), PHILADELPHIA (10,433 tons)

Special Express Train from Southampton to London in one hour and forty minutes. Close connection at SOUTHAMPTON for Havre and Paris by special fast twin-screw Channel Steamers.

**RED STAR LINE** NEW YORK  
ANTWERP  
PARIS

Sailing Every Saturday at 10 A. M.

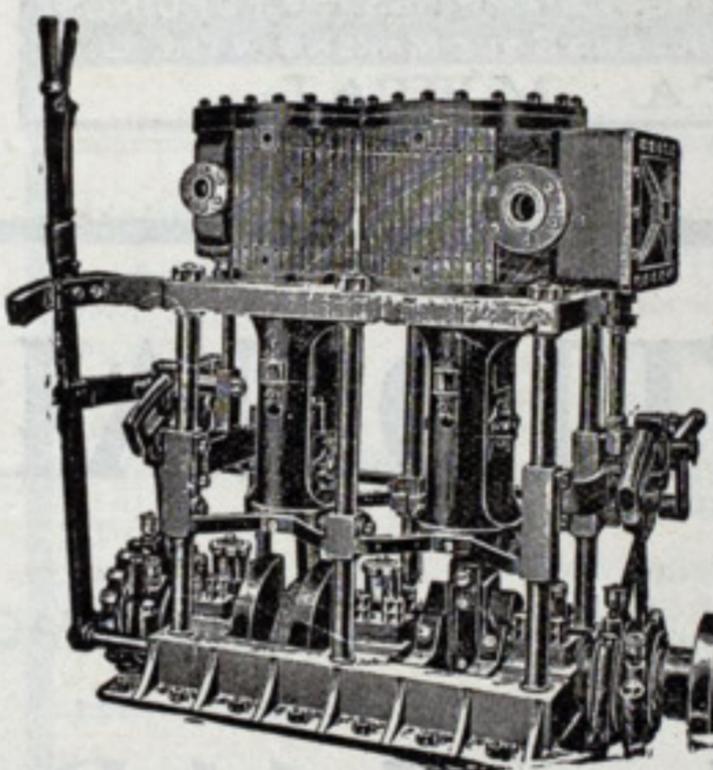
FINLAND (12,760 tons), KROONLAND (12,760 tons),  
ZEELAND (11,905 tons), VADERLAND (11,899 tons).  
One of the Shortest Routes to BELGIUM, HOLLAND, FRANCE,  
GERMANY, THE RHINE, SWITZERLAND and ITALY.

Send for "Facts for Travelers."

Office, Empire Building 73 Broadway, New York.

305-307 Walnut St., Philadelphia.  
Fiske Building, 89 State Street, Boston.  
306 F St., N. W., Washington, D. C.  
Cor. Dearborn & Washington Sts., Chicago.  
Third and Pine Streets, St. Louis.  
10-12-14 Washington Ave., S., Minneapolis.  
30 Montgomery St., San Francisco.

PIERS: 14 & 15 NORTH  
RIVER, FOOT OF FULTON ST., NEW YORK.



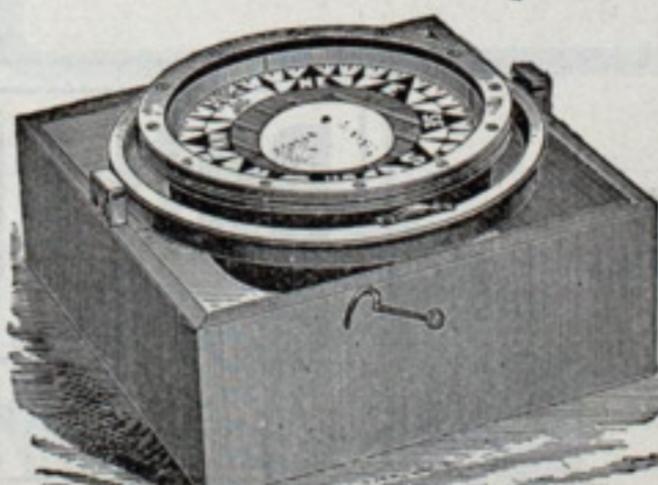
**Chas. P. Willard & Co.**

F. C. WALTER, Manager.  
30 W. Randolph St., CHICAGO.

Builders of  
Marine Engines and Boilers, Paddle Wheel Engines, Boat Machinery, High Pressure, Compound and Triple Expansion Engines, Yachts and Launches.

Write for Catalogue.

## RITCHIE LIQUID COMPASS



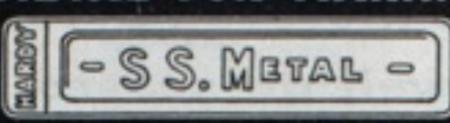
six needles, the best instrument for iron ships.  
and nautical instrument dealers.

CATALOGUE FREE.

**E. S. RITCHIE & SONS,**

Manufacturers of Nautical and Physical Apparatus,  
BROOKLINE, MASS., U. S. A.

**HARDY'S S.S. METAL.**  
THE MOST DURABLE AND SATISFACTORY  
BABBITT METAL FOR MARINE SERVICE

FACSIMILE OF INGOT  
HAS STOOD THE TEST OF 30 YEARS.  
MANUF'D SOLELY BY W.H. HARDY, FITCHBURG, MASS. U.S.A.

TELEPHONE WEST 244. RESIDENCE, 183 LAWN ST.  
**LAKE ERIE BOILER WORKS,**  
J. J. KEENEN & SONS, PROPRIETORS.  
Boilers, Tanks and Sheet Iron Work, Coal and Ore Buckets.  
REPAIRING A SPECIALTY.  
Also Flues Taken Out, Placed and Reset, New Flues always in Stock.  
COR. ELM AND HEMLOCK STS., CLEVELAND, O

**PHOSPHOR BRONZE**  
REG TRADE MARKS



THE PHOSPHOR BRONZE SMELTING CO. LIMITED,  
2200 WASHINGTON AVE., PHILADELPHIA.  
"ELEPHANT BRAND PHOSPHOR-BRONZE"  
INGOTS, CASTINGS, WIRE RODS, SHEETS, ETC.  
— DELTA METAL —  
CASTINGS, STAMPINGS AND FORGINGS.  
ORIGINAL AND SOLE MAKERS IN THE U.S.  
DELTA METAL

## Just from the Press

Most Valuable Little Book ever  
issued by The Marine Review

Send for it on Approval.

A set of tables showing the time required at different rates of speed, 8 to 15 miles an hour, to cover distances between all ports on the Great Lakes. A time-saver to the vessel owner or vessel agent as well as captain or engineer.

Everything at a Glance

Examination of it for the Asking.

Price \$1.00

THE MARINE REVIEW PUB. CO.  
Wade Building, Cleveland.

# NATIONAL TUBE CO.,

MANUFACTURERS OF

## Seamless Cold Drawn Steel Tubing

IN ALL SIZES FROM 1-8 TO 16 in. DIAMETER.

Stay Tubes,  
Water Grates,  
Compressed Air  
and High Steam  
Pressures.

**BOILER TUBES**  
FOR ALL CLASSES  
OF MARINE WORK.

Hollow Shafts,  
Bushings,  
Hydraulic Tubes,  
Etc., Etc.

### SALES OFFICES:

Havemeyer Building, New York.  
Frick Building, Pittsburg.  
Western Union Building, Chicago.

267 So. Fourth St., Philadelphia.  
420 California St., San Francisco.

### FOREIGN OFFICES:

Dock House, Billiter Street  
London, E. C., Eng.

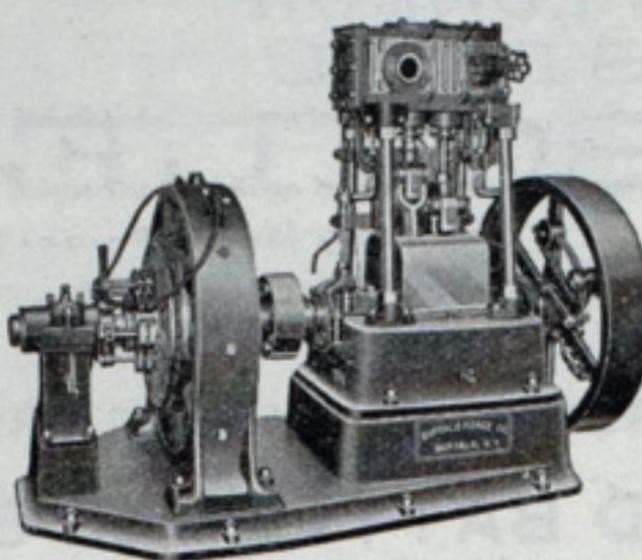


## BUFFALO ENGINES

For  
MARINE  
LIGHTING  
PLANTS

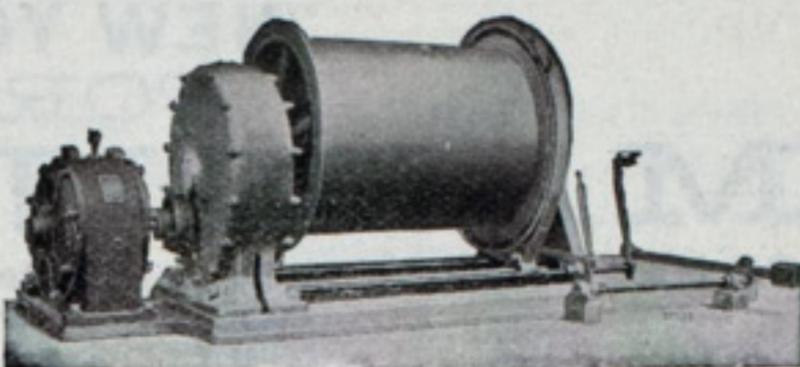
COMPACT  
DURABLE  
ACCESSABLE

See New Catalogue



**Buffalo Forge Company**  
BUFFALO, N. Y.

## Westinghouse Motors



Westinghouse Induction Motor Driving Friction Drum Hoist

Accelerate and lower the cost of handling material  
on docks and in warehouses.

They are described in Circulars 1042 and 1050

**Westinghouse Electric & Mfg. Co.**  
Pittsburg, Pa.  
Sales Offices in all Large Cities

## The Shipowners Dry Dock Co.,

CHICAGO.

Repairs to  
Steel and Wooden Vessels.

Three Docks at Halsted  
Street and North Branch.

OFFICES, RIALTO BUILDING.

OFFICE TELEPHONE, HARRISON 1020.  
YARD TELEPHONE, NORTH 1659.

**W. W. WATTERSON, Supt.**  
TELEPHONE, LAKEVIEW 198.



**ASHTON**

Cam Lever Pop Safety Valves  
and Non-Corrosive steam gauges  
give highest efficiency and durability.  
Specify them and get the best.

The Ashton Valve Co., Boston, New York  
and Chicago, U.S.A.



## GENERAL ELECTRIC COMPANY'S PROJECTORS.



*Hand, Pilot House or Electrical  
Control.*

Operated from Direct Current Incandescent  
Lamp Circuits.

Write for Catalogue.

GENERAL OFFICE, SCHENECTADY, N. Y.

CLEVELAND OFFICE,  
310 NEW ENGLAND BUILDING.

SALES OFFICES IN ALL LARGE CITIES.

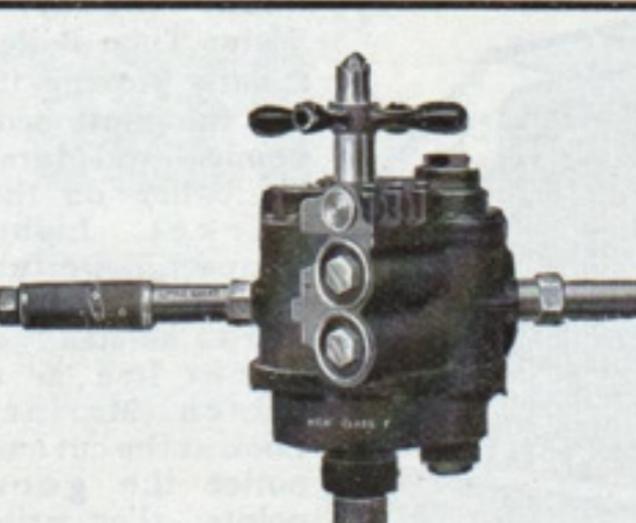
18 inch Projector.  
Pilot House Control.

**THE  
BOURNE-FULLER CO.**

**IRON, STEEL  
and  
PIG IRON.**

Cleveland, O.

Our stock includes all sizes of Beams, Channels,  
Angles, Tees and Plates, with facilities for cutting to  
lengths. See our stock list.



**AIR  
COMPRESSORS**

Built in all  
Capacities

Complete  
Air Plants  
Installed.

Pneumatic Appliances of Every Description.

WRITE FOR CATALOG.

**CHICAGO PNEUMATIC TOOL CO.**

General Offices: Fisher Bldg., CHICAGO. Eastern Office: 95 Liberty St., NEW YORK.

